JOURNAL OF A TOUR THROUGH NORTH WALES AND PART OF SHROPSHIRE;...

Arthur Aikin

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JOURNAL OF A TOUR

THROUGH

NORTH WALES

AND

PART OF SHROPSHIRE;

WITH OBSERVATIONS IN

MINERALOGY,

AND OTHER BRANCHES OF

NATURAL HISTORY.

By ARTHUR AIKIN.

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1797.

TO

CHARLES KINDER

AND

CHARLES ROCHEMONT AIKIN,

HIS COMPANIONS IN THE TOUR

RECORDED IN THE FOLLOWING PAGES,

THIS WORK

IS INSCRIBED,

BY THEIR

SINCERELY AFFECTIONATE FRIEND,

ARTHUR AIKIN.

PREFACE.

THE tour, an account of which is now preſented to the public, was made during the ſummer of the year 1796, partly for amuſement, but principally as a ſupplement to the mineralogical ſtudies of the author. From the peruſal of books, and the examination of cabinet ſpecimens, I wiſhed to proceed to the inveſtigation not of minute detached fragments, but of maſſes of rock in their native beds; to obſerve with my own eyes the poſition and extent of the ſeveral ſtrata, the order obſerved by nature in their arrangement, and the gradual

or more abrupt tranſitions of one ſpecies of rock into another. To ſee the whole proceſs, alſo, of mining; of extracting the ore, reducing, refining, and manufacturing it, was one of my chief *agenda*.

The meaſure of my ſucceſs on theſe points muſt be eſtimated by the reader, who I truſt will have the candour to make thoſe allowances which the extent and difficulty of the ſubject, added to the ſhortneſs of the time which I was able to allot to theſe obſervations, neceſſarily demands. I ſhall be unfortunate, if, in mentioning the great name of Sauſſure, I ſuggeſt any compariſon in the mind of the reader, between the elaborate performances of that eminent mineralogiſt and the preſent humble publication; yet I think it right to obſerve, that the peruſal of the *Voyages dans*

dans les Alpes, ſuggeſted to me the idea of a tour into Wales upon ſomething of a ſimilar plan; and I have been not a little pleaſed in verifying among the Welſh hills ſome of the general obſervations laid down by Sauſſure as the reſult of his arduous journies among the ſnows of the Alps.

The greater part however of this little volume is taken up with a deſcription of the principal of thoſe ſcenes of beauty and grandeur which are ſcattered ſo profuſely through North Wales. It would have been eaſy, by increaſing the ſelection of ſcenes, to have enlarged the book; I am not certain however, that by ſo doing I ſhould not have rather wearied than gratified the reader. In the following pages the *characteriſtic* features of Welſh landſcape are deſcribed

in a great variety of combinations; and in theſe, their intrinſic excellence will, I doubt not, atone for the occaſional errors of the pencil with which they have been traced. A mere outline of an intereſting object is itſelf intereſting; but it requires the *creative* hand of a profeſſed artiſt, by the ſkilful combination and contraſt of light and ſhadow, to convert a cottage or rude ſtone-quarry into a beautiful landſcape.

I have ſaid very little of the *manners* of the Welſh, and I perceive that it would have been an advantage had I been able to have given a more copious account of them; but the requiſite knowledge of a ſufficient number of circumſtances from which to deduce a national character is not to be acquired without long reſidence and much intercourſe with the inhabitants: it

it is not to be gleaned in a haſty excurſion through a country, where its language, and the general ſhyneſs and ſuſpicion which the natives diſcover towards the Engliſh, or, to uſe their own word, *Saxons*, oppoſe obſtacles which only time and perſeverance can overcome. It is true indeed that in moſt of the towns the Engliſh language is familiarly ſpoken; but with the adoption of a foreign language, foreign manners and ſentiments have been introduced, and what remains of the proper Welſh character is to be found only in the faſtneſſes round Snowdon, or the wilds of Merioneth.

For the important chapter on the woollen manufactures of North Wales, I am indebted to a friend, whoſe perſonal acquaintance with the ſubject may be depended upon.

Mineralogy

Mineralogy being one of the chief objects of this tour, it was neceſſary to perform it on foot; and from experience of its advantages over any other mode of travelling in this mountainous country, I would warmly recommend it to all whoſe ſtrength will allow them to make uſe of it. On foot a man feels perfectly at eaſe and independent; he may deviate from the road to climb any mountain, or deſcend to any torrent that attracts his notice; whereas on horſeback in many caſes this is impoſſible, and ſeveral of the moſt ſtriking ſcenes can only be viſited on foot.

A map and compaſs are articles of the firſt neceſſity in traverſing a country where the inhabitants are ſo thinly ſcattered, and the roads frequently ſo obſcure that the courſe of the ſtreams is generally the ſureſt direction. The map that we made uſe of

is a large nine ſheet one publiſhed about three years ago by the late Mr. Evans; it was paſted on canvas, and folded up into ſingle ſheets for the conveniency of carriage. Of this map it is not eaſy to ſpeak too highly. Every turning of the road, every winding of every rivulet, is laid down with the moſt ſcrupulous exactneſs, and the plan of every mountain is given with ſuch minute accuracy, that a perſon converſant with the forms of mountains may, by a bare inſpection of the map, diſtinctly trace the courſe of the primitive, ſecondary, and limeſtone ridges through the whole of North Wales. Of this map an impreſſion has lately been publiſhed of the reduced ſize of a ſingle ſheet, which will anſwer the purpoſes of moſt travellers as well as the larger one.

I have

I have only to add, that if the reader derives any pleaſure or profit from the peruſal of the following pages, at all comparable to what the excurſion afforded to myſelf, I ſhall think the time occupied in writing them by no means uſeleſsly employed.

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CHAP. I.

Neſcliffe—Llanymynech lime works—Vale of Tannad—Piſtyll-Rhaiadr—Llangynnog lead mines and ſlate quarries—Bala.

July 25, 1796.

We took leave of our Shrewſbury friends this morning, and croſſing the Welſh bridge proceeded on the high road to Oſweſtry, as far as Neſcliffe, a little village ſituated at the foot of ſome free-ſtone rocks, and diſtant from Shrewſbury about eight miles. In this walk, the high wooded banks of the Severn at Shelton bank and Montford bridge afforded ſeveral pleaſing ſcenes, varying conſiderably as the proſpect was viewed from the ſteep ſlope covered with trees, that forms one bank of the river, or the line of rich level

meadows that confines the ſtream on the oppoſite ſide. Near Montford bridge we met with the *Geranium moſchatum*, and *Campanula rapunculus*, both of them rare plants in this neighbourhood. A little further on, the road aſcends, and preſented us with a fine view of the three Breddin hills riſing abruptly from the plain to the height of about a thouſand feet, and marking the boundary between the counties of Montgomery and Salop: on the ſummit of the largeſt hill ſtands a column of conſiderable height, which was erected to record the ſplendid victory of Rodney over the French fleet in the year 1782. As we advanced, the road was rendered ſtill more intereſting by the addition of the Neſcliffe rocks, a low range of red freeſtone, the top of which is occupied with a beautiful wood in fine contraſt to the excavations and quarries in the ſides. Theſe quarries are ſtill worked, but they were formerly in greater repute than at preſent. The red ſtone, of which the caſtle, abbey, town walls, and moſt other old buildings in

Shrewſbury, are formed, in all probability was brought from this place, but of late years it has been ſuperſeded by the white freeſtone from Grinſhill. Intermixed with the red are ſome ſtreams of a light buff colour; they both work equally well, and are uſed indifferently for building; the red kind however yields much more eaſily to the weather, probably on account of the greater quantity of iron that it contains. The ſteep ſides of the hill where the bare rock makes its appearance, and eſpecially the weſtern ſide, are marked with deep waved regular furrows, exactly reſembling thoſe ſand rocks that have been long expoſed to the daſhing and attrition of the ſea; and in all probability this has really been the caſe here, as I hope to be able to ſhew when I come to the ſurvey of the plain of Shrewſbury. This crumbling rock ſeems particularly favourable to the growth of *Erica vulgaris*, *Solidago virga-aurea*, and *Vaccinium myrtillus maj.* which here grow to an unuſual height and ſize, while the ſheltered lane from the village

to the quarries produces blackberries uncommonly large and well flavoured. Nefcliffe itſelf is a very inconſiderable place, and only remarkable for a ſingular inſcription over the door of the public ſchool:

" God proſper and prolong this publie good,
" A ſchool erected where a chapel ſtood."
1753.

To what religious ſect this chapel belonged I have not been able to learn, but as this exultation would hardly be permitted over the fall of one devoted to the eſtabliſhment, it had probably been occupied by the Roman catholics.

On Knockin heath, a little beyond Nefcliffe, we quitted the Oſweſtry road, and proceeded through a deep ſand to the village of Kinnerly. On our right were ſeveral fields of fine *buck-wheat*, and in the wet parts of the moor on our left we perceived the *Parnaſſia paluſtris* and *Oſmunda regalis*. Among the drieſt and deepeſt ſand were many gigantic plants of *Trifolium arvenſe*. The ſoil as we proceeded changed

changed to a deep clay, which continued to the foot of the hill of Llanymynech. We dined with Dr. Evans, at his houſe at Lwyn-y-groes, ſituated on the bank of the Virnwy, and embowered in wood; and in the afternoon aſcended the hill of Llanymynech, whence we enjoyed a moſt extenſive and beautiful proſpect. The Severn, with its tributary ſtreams the Virnwy and Tannad, were ſeen proceeding from their reſpective vales, ſweeping through them in elegant curves, and at length uniting their waters, and flowing into the rich plain of Shrewſbury; at a conſiderable diſtance, and enlightened by the ſun, glittered the lofty water-fall of Piſtyll Rhaiadr; on our left, the view was occupied by the Breddin hills, and the whole length of the more diſtant horizon preſented a front view of the Ferwyn mountains, whoſe higheſt ſummits were loſt in the ſplendid clouds of a fine ſunſet after a very ſhowery day.

The hill of Llanymynech is not only remarkable for the fine proſpect from its top, it is ſtill more worth notice as con-

taining by far the moſt extenſive *lime-works* of any in this part of the country. The lime of Llanymynech rock is in high requeſt as a manure, and is ſent by land carriage as far as Montgomery, Newtown, and even Llanidloes: it ſells at the kilns for ſeven-pence a buſhel, and from 30 to 36 buſhels are reckoned a waggon load; the coal with which it is burnt, is brought partly from the neighbourhood of Oſweſtry, and partly from Sir W. W. Wynne's pits near Ruabon. The lime lies in ſtrata, parallel to the horizon, and varying in thickneſs from three inches to five feet; it is of an extraordinary hardneſs, with but little calcareous ſpar, and few ſhells or other marine exuviæ; its colour reddiſh brown, burning to almoſt white. Between the ſtrata of lime we found a very tenacious ſmooth clay, orange coloured ochre, and green plumoſe carbonate of copper, or malachite. It was in ſearch of this copper that the Romans carried on here ſuch extenſive works, of which the remains are ſtill very viſible: they conſiſt of a range of

of from twenty to thirty ſhallow pits, the heaps of rubbiſh from the mouths of which abound with ſmall pieces of copper ore, and a cave of conſiderable dimenſions terminating in an irregular winding paſſage of unknown length, connected with which are two air ſhafts ſtill remaining open, and the appearances of ſeveral others now filled up: in ſome of theſe caverns are found large and beautiful ſpecimens of ſtalactite. One of the levels was explored ſome years ago, and in it was diſcovered a ſkeleton, with mining tools and ſome Roman copper coins. The whole maſs of the hill ſeems more or leſs impregnated with copper: wherever the ſurface is uncovered there are evident marks of the preſence of this metal, and the ſtones compoſing the rampart of Offa's dyke, which encompaſſes two ſides of the hill, are in many parts quite covered with cupreous efflorescences. Between the village and the rock paſſes a branch of the Elleſmere canal, which when navigable will add much to the value of theſe works by rendering them more ac-

ceſſible to the ſurrounding country, and may induce ſome ſpirited adventurers to recommence a ſearch after copper, which it is evident was formerly proſecuted with conſiderable ſucceſs. The hill of Llanymynech aſcends gradually out of the plain of Shrewſbury, having its abrupt declivity, or *eſcarpement*, on its weſtern ſide, facing Wales, and oppoſed to the current of the Tannad, which flows below it. Its north ſide too deſcends rapidly into the paſs through which the high road from Llanrhaiadr runs; as is the caſe alſo with its ſouthern ſide, which fronts Breddin, theſe two hills forming the boundaries of the united vales of the Tannad, Virnwy, and Severn, at their entrance into the plain of Salop. On the eaſtern ſide the deſcent of the *lime* is as abrupt as on the northern and ſouthern extremities, but a bank of tender ſhivery ſlate or ſhale extending along it, cauſes the apparently gentle declivity.

The plants on the rock are ſuch as are always found to denote the preſence of calcareous

calcareous earth; of which the chief are, *Anthyllis vulneraria*, *Ciſtus belianthemum*, and *Roſa ſpinoſiſſima*. We paſſed the evening at the village of Llanymynech, prettily ſituated on the bank of the Virnwy, a conſiderable ſtream, abounding in fiſh, and bringing a large ſupply of water to the Severn, with which it unites juſt at the foot of the Breddin hills.

The next day, reſuming our journey, we deſcended by the ſide of the lime-works into the Vale of Tannad, a beautiful little river that falls into the Virnwy a few miles above the junction of this latter ſtream with the Severn. Quitting the high road, we kept as cloſe as we were able to the river-ſide, and were amply recompenſed for our trouble by a ſucceſſion of enchanting ſcenes, not diſcernible from the public way. Hills covered with wood, the river foaming along its pebbly channel, and daſhing over the roots of old oaks and alders; the proſpect ſometimes ſo contracted as to ſhew nothing but the river, overhung by aſhes and other trees of the moſt

moſt vivid green; at other times enlarging ſo as to admit a view of the mountainous barrier of the valley. From Llanyblodwel to Llangedwin we were preſented with new beauties at every ſtep, freſhened by the rain, and illuminated by tranſient gleams in the ſhort intervals between the ſhowers. The day began to clear as we arrived at Llanrhaiadr, which we paſſed through without ſtopping, except for a few minutes, to admire the impetuous deſcent of the torrent that gives its name to the town. We aſcended the bank of this ſtream towards its ſource, and proceeded to the celebrated waterfall of Piſtyll-Rhaiadr, about three miles higher at the head of the vale. We were ſo fortunate as to ſee the cataract in great perfection; the torrent Rhaiadr, ſwollen unuſually by heavy ſhowers, was precipitated at two tremendous leaps, an hundred and thirty feet from the rocks which abruptly terminate this end of the valley. The ſcene is entirely deſtitute of the accompaniment of trees; nothing meets the eye but the fall, and huge

huge dark perpendicular cliffs riſing in front and on each ſide; on one of which is moſt ſtrikingly impreſſed the devaſtation occaſioned by the ſudden burſting of a cloud on its ſummit; a deep gully, growing wider as it deſcends, interſects the mountain, and terminates on the valley below in a large bank of rocky fragments. Simple ſublimity is the character of the ſcene, which the addition of trees would diſtract and impair, without ſo far deſtroying as to render it beautiful. The gradual change from beauty to ſolitary ſublimity is moſt ſtrikingly exhibited to thoſe who aſcend the vale of Rhaiadr; near the town, the view in front and on each ſide preſents a mingled aſſemblage of houſes, rocks, woods, and a ſtream breaking into ſeveral continued rapids and ſmall falls; while behind, the vale of Tannad diſplays its wooded hills enlivened by villages, and gentlemen's houſes, occupying the moſt beautiful ſituations. On aſcending the ſtream, the valley becomes more rocky and contracted, the line of paſture along its

its bottom is reduced to narrower dimenſions, and at length entirely ceaſes, the craggy banks of the torrent being overhung with oaks, firs, and the mountain-aſh diſtinguiſhed by its crimſon berries; while the pendent birch occupies the higher parts of the mountain, ſheltering the cottages that appear like neſts through the foliage, and are ſometimes only marked by a wreath of blue ſmoak curling among the branches. On aſcending ſtill higher, large fragments of rock, detached from the cliffs above, are ſeen obſtructing the courſe of the water; the wood becomes thinner and leſs luxuriant, and the cottages more rare, till at length the trees ceaſing, the valley expands into a theatrical form, the rocks ſoar to a greater height, a natural paſture divided by no fences, but interſected by the ſtream, and diverſified by enormous blocks of dark ſtone, forms the floor; while the caſcade falling from a cliff in the centre of the rocky ſkreen, appears directly in front. There are two ſeaſons when this grand cataract

taract may be ſeen in perfection, but theſe are ſeaſons when few people chooſe to venture beyond the fire-ſide: one is during or immediately after a heavy ſhower in the rainy ſeaſon; the other is in the middle of a hard froſt, when the mountains covered with ſnow, and the caſcade overhung by cryſtal pillars of ice, of the moſt groteſque forms, glittering in the ſun, compoſe a ſcene whoſe beauty and ſingularity cannot be deſcribed by words, and in the repreſentation of which the pencil would equally fail.

After admiring the proſpect, and gathering ſome plants that we met with near the fall, the chief of which were *Pinguicula vulgaris*, *Fumaria claviculata*, and *Cotyledon umbilicalis*, we ſcaled the cliffs with conſiderable difficulty, and by fording the Rhaiadr about half a mile above the fall, and traverſing the bogs on the top of the mountains, arrived by a laborious deſcent at the village of Llangynnog, where we dried ourſelves, and ſatisfied a craving appetite,

petite, which a walk of eight hours had excited.

After dinner we bent our ſteps towards a lead mine a few hundred yards off the village. The rock is a coarſe ſlate, abounding with white opaque amorphous quartz, in which are found conſiderable quantities of lead and calamine, both of which are ſent raw to the founderies near Ruabon. The mines are divided among a number of ſmall independent proprietors, and in conſequence are worked with little ſpirit; none of the ſhafts run to any conſiderable depth, nor are any engines made uſe of, except merely a wheel and bucket. The great lead mine of Llangynnog called *Craig-ymwyn mine*, which formerly afforded to the family of *Powis-caſtle* a revenue of many thouſand pounds per annum, is ſituated in the mountainous ridge that divides the vales of Rhaiadr and Tannad; it is at preſent filled with water, but a company of adventurers have lately taken a leaſe of it, and are about to drive

drive a level of conſiderable length, for the purpoſe of draining it*. Oppoſite the firſt mentioned lead mines, on the other ſide of the village, riſes almoſt perpendicularly the lofty rock of Llangynnog, which ſupplies the neighbourhood with a conſiderable quantity of coarſe ſlates†; theſe are procured near the ſummit of the mountain, and brought down in a very ſingular and hazardous manner. The vehicle in which they are conveyed is a ſmall ſledge that will contain three or four cwt. of ſlates; on the fore part of the ſledge is faſtened by both its ends a ſhort rope. When loaded, it is drawn to the edge of the declivity; a man places himſelf before it, with his face towards the ſledge and

* The vein of ore in this mine was three yards and a half thick, and was worked to the depth of an hundred yards before it was choaked with water: it yielded annually 4000 tons, at ſeven pounds per ton, the clear profits upon which were about £20,000. *Pennant's Welch Tour.*

† This quarry, from Nov. 1775 to Nov. 1776, yielded 904,000, which were ſold from ſix to twenty ſhillings per thouſand. *Pennant.*

the

the rope round his ſhoulders, then graſping the ſledge with his hands, and raiſing his feet from the ground, the load together with the conductor begins to deſcend along a narrow winding path, down the ſcarped, almoſt perpendicular, ſide of the mountain. The motion, though moderate at firſt, accelerates very ſpeedily; and the buſineſs of the conductor is to govern as well as he can the increaſing velocity, by ſtriking the ground with his feet, and by oppoſing them to the projecting points of rock, to retain the carriage in the proper path; the leaſt inattention or want of dexterity, is certain deſtruction; and yet does this man every day hazard his life four or five times, for the trifling pittance of about twopence a journey! Peat is conveyed from the tops of the mountains in the ſame manner, but owing to the lightneſs of the load, is not nearly ſo dangerous an employment; both of them however are ſufficiently hazardous, and yet the inſtances of fatal accidents are extremely rare. The cloſing evening ſent us to our humble inn, where

we ſupped on delicious trout, furniſhed by the Tannad, which flows cloſe by the village.

Our route the next day lay firſt along the vale of Llangynnog, a pretty ſequeſtered ſlip of fertile land encloſed on all ſides by the Ferwyn mountains. It was here, on a former journey, that I was much amuſed with the wonderful activity of two beautiful white goats: they were quietly brouzing on a ſteep rock that overhangs the vale, when ſuddenly, perhaps alarmed at our approach, they reared on their hind legs, and vaulting from crag to crag, deſcended almoſt in an inſtant to the paſtures in the bottom of the valley, while a flock of ſheep ſtood for ſome minutes gazing at them in an attitude highly expreſſive of wonder and admiration. A tolerably good road runs along the ſide of the hills conſiderably above the level of the valley, which at the diſtance of about three miles aſcends from the vale, and is carried for ſeven miles acroſs the Ferwyn mountains. After traverſing this wild country, we at

length arrived at the brow of a hill that overlooked the vale of the Dee, and enjoyed a moſt delighful view, which was rendered doubly intereſting by contraſting it with the uninhabited and uncultivated moors that we had juſt quitted. An eaſy deſcent led to Llandervel, a ſmall village beautifully ſituated on the river-ſide; we croſſed the bridge, and began to aſcend the ſtream, delighted with the grand proſpect that preſented itſelf; the cloudy ſummits of Arran-ben-Llyn and Arran-fowddy ſoaring to a vaſt height, ſometimes obſcured by ſhowers, at other times partially illuminated by the ſun, formed the extreme boundary of the view; the nearer part of which was filled up with wooded hills on one ſide, in fine contraſt to a rugged bare ſlate rock on the other, between which the Dee, brimfull, rolled his duſky waters. As we approached Bala we gained ſome partial views of the lake, but a nearer and more extenſive ſurvey of this noble piece of water, was reſerved for the afternoon.

CHAP.

CHAP. II.

Ferwyn Mountains—Bala—Bala Pool—the Dee.

THE lofty hills acroſs which the road from Llangynnog to Bala is carried, form part of a long chain commonly known under the name of the FERWYN MOUNTAINS. This ridge occupies the eaſtern ſide of Merionethſhire, and branches into Denbighſhire and Montgomeryſhire; its northern boundary is the Dee, its ſouthern one the Tannad: from N. to S. its length is about 16 miles; its breadth from E. to W. varies from five to ten. *Cader Ferwyn* and *Cader Fronwen*, the former near the ſouthern and the latter near the northern extremity, are the moſt elevated points; the general outline therefore forms an eaſy line depreſſed in the middle and riſing on

both ſides. The figure of each individual mountain is for the moſt part a long waved top, deſcending ſharply but not ruggedly. The chief eſcarpement of the *chain* is on the eaſtern ſide, or fronting the plain of Salop; that of each mountain, or groupe of mountains, has, beſides the general ſlope to the eaſt, another principal one, whoſe direction varies in different individuals, according to the curve of the vallies or winding of the ſtreams: in the Vale of the Dee the *northern* ſide of the chain deſcends at an angle of perhaps not leſs than 75°, whereas in the Vale of Tannad the *ſouthern* ſide has a ſtill more abrupt declination: in the Vale of Rhaiadr the mountains deſcend in a N. W. and S. E. direction, thus varying according to circumſtances. The ſubſtance of which theſe mountains are compoſed is *primitive ſchiſtus*, that is, ſuch as does not contain iron pyrites, or any remains or impreſſions of organized bodies, the poſition of the ſtrata being, generally, nearly perpendicular to the plane of the horizon. The greater part of the ſchiſtus

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is in thick irregular laminæ, interſected here and there with veins of quartz, and varies the leaſt of all from a perpendicular poſition; the ſlates, of which the chief quarries are in the mountains of Llangynnog, Cader-Ferwyn, and Sylattyn, are for the moſt part unmixed with quartz, and vary often conſiderably from the perpendicular: the ſhivery ſchiſtus, or ſhale, abounding principally on the eaſtern deſcent of Trim-y-Sarn and the ſouthern boundary of Llangollen vale, is the moſt irregular in its poſition, frequently varying within the ſpace of fifty yards from perpendicular to parallel, contains no quartz, but a good deal of clay, eſpecially where the ſtrata are moſt diſordered. The only metals hitherto found in theſe mountains are lead and calamine, whoſe matrix is the coarſe quartzoſe ſchiſtus; no other mines have been opened except the two near Llangynnog, of which an account has already been given. There are no lakes in the whole extent of theſe mountains, and no ſtreams of any conſequence deſcend

from them except the Ceiriog, which flows by Chirk, and the Rhaiadr; of courſe therefore the vallies are few and inconſiderable, the cultivated land bearing a very ſmall proportion to the waſte, and the inhabitants few in number. The ſoil is *peat*, a yard or more in depth, lying upon a thin ſtratum of rounded pebbles, chiefly quartz, with ſome ſchiſtus; the bottom of the *bogs* is a grey clay, formed probably from the decompoſition of the rock: the dryer parts are covered with heath now coming into bloſſom, which is frequently ſet fire to by the ſhepherds for the ſake of the young plants and graſs which ſoon overſpread the vacancy with a favourite food for their ſheep. The bogs or *turberies* ſupply the inhabitants with fewel, which would otherwiſe be a ſcarce article in theſe parts. This wide extent of unoccupied country affords a ſecure retreat to numerous foxes that often ſurpriſe the active ſheep in their ſcanty ſummer paſtures, and during the winter ſteal into the vales, and carry off all the poultry that comes within

within their reach. Kites, moor-buzzards, and other birds of prey, here make their neſts in ſecurity; and the long heath ſhelters the grous, a race that would have been extinct here but for the wide range of theſe wild mountains, and which, notwithſtanding their protection, is rapidly on the decline, owing principally to the improved ſtate of the roads, which admit the carriage of game to greater diſtances than formerly. Many rare mountainous plants are found here, as the Rubus-Chamæmorus and Vaccinium Vitis-Idæa, whoſe berries are ſo grateful a food to the grous, Saxifraga-nivalis, &c.

Bala, although neither a county town, nor in a fertile neighbourhood, and deſtitute of the advantages of water carriage, is yet equalled in ſize or population by few places in North Wales. It is ſituated on the eaſtern extremity of the fine lake to which it gives a name, and whoſe fiſh contribute largely to its ſubſiſtence. A good deal of conſequence is derived from its fairs and markets, which, owing to its central

ſituation, are very numerouſly attended from all the ſurrounding country: it poſſeſſes alſo a conſiderable manufacture of woollen gloves and ſtockings, the produce of which is annually ſent to England. Knitting indeed is the general leiſure work of both ſexes in Wales, eſpecially about Bala, and it cannot fail of giving ſtrangers a high idea of the induſtry of the people to ſee the men and women going to market with burdens on their heads, while their hands are employed in working the fleeces of their own ſheep into articles of dreſs, coarſe indeed, but equally warm and ſerviceable with the more coſtly and elaborate manufactures.

The object beſt worth notice in this neighbourhood is BALA POOL, or *Pimble-mere*, by far the largeſt lake in all Wales: its length from north-eaſt to ſouth-weſt is about four miles, its breadth in the wideſt part is 1200 yards. The water, like that of moſt other rocky lakes, is ſo pure, that the moſt delicate chemical teſts detected ſcarcely any perceivable quantity

quantity of foreign admixture. The ſouth-weſtern extremity, where three mountain torrents fall into the pool, is the ſhalloweſt, owing to the great quantity of earth and ſtones which are born down in flood-time from the country through which they flow: the gradual aggregations have formed ſeveral banks and low iſlands in this end of the lake, and in conſequence obliged it to encroach proportionably on the north-eaſtern boundary; this tendency is further increaſed by the prevalence of ſtrong weſterly winds, which drive on the ſhore a heavier ſurf than would be imagined; when theſe two cauſes combine, a circumſtance that not unfrequently happens, the waters riſe to ſuch an alarming height as to threaten the town of Bala with an inundation, were it not for a dyke that is raiſed on the ſhore: the water being thus obſtructed pours over the road at the extremity of the mound, and diſcharges itſelf into the low grounds through which the Dee flows, doing no ſmall damage to theſe rich and extenſive paſtures. The lake

lake is well ſtocked with excellent fiſh, of which the red-trout and gwyniad are eſteemed the moſt delicious. Theſe are all caught by angling from the ſhore, for Sir W. Wynne, who claims the property of the whole pool, will not allow any boats to be kept upon it; a cruel and abſurd reſtriction, thus wantonly to deprive the inhabitants of the advantages that nature has ſpread before them, and, in a country where the means of ſubſiſtence do not over-abound, unjuſtly to abridge them, without deriving from the prohibition the ſmalleſt private emolument! It has now and then happened, in very ſevere winters, that the lake has been frozen over; and, when covered with ſnow, has been miſtaken by travellers for a wide valley or plain. The ſhores of the pool are extremely diverſified, and from every point of view preſent an agreeable and ſtriking proſpect; it muſt however be confeſſed, that if the woods were in general deepened, and ſome of the rocks brought nearer the edge of the water, the improvement would be very great.

great. The view from the Bala ſide is perhaps, upon the whole, the beſt: you turn your back upon the town and the Dee, and looking along the length of the pool, on the right hand a line of corn-fields and cultivated meadows is ſeen accompanying the water, and bounding it with a girdle of verdure; the neareſt object on the left, is the bridge through which the lake diſcharges its ſuperfluous water, forming the river Dee; immediately above which, towers a rocky hill of conſiderable elevation, covered with an old wood; to this ſucceeds a range of crags increaſing in height till they terminate in the lofty ſummit of *Arran-ben-Llyn*, ſhrowded in clouds, while immediately in front, and apparently cloſe upon the farther extremity of the lake, are ſeen the cloudy tops of the two *Arennigs*, of *Arran-fowddy*, and, riſing high in the diſtant horizon, the triple head of the majeſtic *Cader-Idris*.

From the north-eaſtern corner of the lake iſſues the river DEE, a ſtream of reſpectable ſize and depth at its very outſet, even

even in the drieſt ſeaſons; but at this time, owing to inceſſant rains and a ſtrong weſterly wind, brimfull, and ſhooting with great velocity in dark and turbid eddies, through the arches of a rough ſtone bridge that croſſes it a few yards from the pool. The etymology of the name has been the ſubject of a good deal of controverſy; ſome deriving it from Ddhû, a Britiſh word ſignifying divine; others from Ddû, a word meaning black or dark; a third party, again, affirm that the appellation aroſe from the *two ſources* of the river, the word Dû meaning two: where all have an equal claim, it is difficult to decide. "Deva's wizard ſtream" was certainly held in particular veneration by the druids, and there would be no difficulty in allowing that, as Divona was the Roman name of ſeveral ſtreams that were thought peculiarly ſacred, the Dee might have a name ſignificative of the ſame circumſtance, provided no other etymology applied to it equally well. Mr. Pennant denies the dark colour of its water; I have however ſeen the Dee three

three ſeveral times at Bala, in rainy and dry weather, and it certainly acquires a *deep tan* colour before it has flowed half a mile, which it retains through the whole of its courſe in Wales: indeed, ſeveral of the Welſh ſtreams have this tinge; the Conway and Virnwy, among the reſt; evidently owing to the moſſes and bogs from which moſt of the rivers riſe, or through which they flow; and *Rhaiadr-Ddû*, a waterfall near Dolgelle, is ſo called from the remarkably duſky hue of the torrent. But perhaps the word *Dû* (two) has the beſt claim to the honour of giving a name to the river, for the common people trace the ſtream above Bala pool, through which its waters are erroneouſly ſuppoſed to flow unmixed, to a mountain torrent called the *Dû*, formed of *two* rivulets that riſe from the foot of *Arran-ben-Llyn:* in like manner *Afon-dû*, a torrent that falls into the *Mawddach*, is ſo called from its double ſource. The trout in the Dee have white fleſh, whereas thoſe in the lake have their's always *red*; the reaſon of this difference is

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not, I believe, aſcertained, nor is it known why thoſe in the river never treſpaſs into the pool, or thoſe in the pool venture into the river; though of the *fact* there ſeems to be no good reaſon for doubt.

The rarer plants that we met with about Bala, are Ophrys biſolia, Vicia ſylvatica, Viola grandiflora, Narthecium oſſifragum, Thalictrum alpinum, and Lobelia dortmanna.

CHAP.

CHAP. III.

Vale of the Twrch—Bwlch-y-groes—Mallwyd—Machynlleth—Eſtuary of the Dovey—Aberyſtwith.

July 28.

LEAVING Bala this morning, we continued our journey along the northern and weſtern ſhores of the lake, through the villages of Llanycil and Llanuwchllyn; near this latter place we croſſed the Llew, the Dû, and Twrch, three large torrents, which ſoon after uniting, pour into the lake their mingled tribute. The mountains now begin to aſſume a bolder ſtyle, and more majeſtic character; the craggy aſcent of Arran-ben-Llyn commences here, and is continued for nearly two miles. The clouds in which it was enveloped deterring us from attempting to gain the ſummit, we proceeded along the high road

to Dinas-y-Mowddwy, mounting with difficulty up the wild and rough glen through which the Twrch, a moſt boiſterous ſtream, ruſhes in a continued ſeries of broken caſcades. It will readily be conceived that the inhabitants are not very numerous in a narrow tract overhung by mountains, whoſe beſt ſoil is a wet bog, in many places impaſſable except during the height of ſummer, and whoſe beſt produce is a coarſe graſs overrun by long moſs, and adapted only to the ſuſtenance of a hardy diminutive race of ſheep and black cattle, that run almoſt wild in the moſt rocky and barren faſtneſſes of the higheſt Welſh mountains. The cottages that we met with here, were the rudeſt of any that we ſaw during our whole tour; their walls are formed of large rounded blocks of quartz and other ſtones piled one upon the other, having the interſtices filled up with ſmaller fragments and lumps of peat: the roof is compoſed of broad irregular pieces of coarſe ſlate, in which a large hole, encircled by ſticks that are faſtened together by a ſtraw

a ſtraw rope, ſerves the purpoſe of a chimney. The forlorn appearance without correſponds to the wretchedneſs within, where a timid, reſerved, and ſuſpicious race of men, ſubject to the miſchiefs, without participating in the benefits of civil union, with difficulty contrive to keep up an exiſtence, cheerleſs as their own mountains, ſhrowded in ſnow, and clouds, and ſtorms. Every tranſient gleam of ſunſhine was taken advantage of by the inhabitants, who were at this time in the middle of their hay harveſt; we ſaw them ſpreading their ſcanty crop by hand, carefully turning it in the ſame laborious manner, and to our mortification, as well as theirs, were witneſſes to the approach of a black cloud rolling over the tops of the mountains, and deluging with inceſſant ſhowers the vale below—" ibi tum labor omnis effuſus!"

Continuing our journey ſtill up the ſtream, we arrived at length at the entrance of the important military paſs of Bwlch-y-groes, or, the paſs of the croſs, ſo called from a crucifix which was anciently erected at the

ſummit of this aſcent. Before, however, we entered the paſs, we turned aſide a little on our right, to admire a very ſtriking caſcade of the Twrch. The bed of the torrent was here filled with enormous maſſes of rock ſeveral yards in diameter, piled one upon the other in a moſt ſingular and wonderful manner, and deeply worn by the conſtant action of the water, which boils and foams and ruſhes with vaſt impetuoſity through the intervals between the rocks, which were themſelves adorned with large tufts of ſaxifraga nivalis, and other plants in full flower. About a quarter of a mile above the fall is a craggy perpendicular cliff bending over the water, whence no doubt theſe ſurpriſing ruins were detached by the force of froſt, or the irreſiſtible ruſhing of the torrent ſwelled unuſually by heavy rain; the pieces, as they fell, rolled along the bed of the ſtream, till one being at this place interrupted in its further progreſs, ſtopped alſo all the reſt that were behind it; the deſcent of the current heaped them upon each other

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in their preſent diſorderly arrangement, but was unable to ſweep away the mound; it has however left deeply engraven marks of its violence, and by its gradual, though conſtant eroſion, will probably at ſome future period, aided by ſome high ſpring flood, tear away theſe obſtacles, and carry their ſhattered fragments into Bala pool. Returning into the road from this romantic ſpot, we began to aſcend the ſteep mountain of Bwlch-y-groes by a moſt miſerably rugged road of looſe ſlates, rendered ſlippery by the rain which was coming down with increaſing violence. We at length gained the ſummit, and deſcended by a noble broad terrace road juſt finiſhed, down the oppoſite ſide of the mountain, croſſing ſeveral ſmall rivulets that, uniting, form the ſource of the river Dovey, a large ſtream that gives its name to the valley. We ſoon arrived at Llan-y-mowddû, whence we proceeded to Dinas-y-mowddû, paſſing on our right a moſt beautiful caſcade formed by the river Cowarch, which haſtens to mingle its wa-

ters with the Dovey. We paſſed through Dinas-y-mowddû without ſtopping, and halted for the night at Mallwyd, two miles lower down the vale, where we found a very tolerable inn. We employed the remainder of the afternoon in ſurveying the romantic beauties with which this village is ſurrounded. Several delightful ſcenes preſented themſelves to our ſearch, but with the falls of the Dovey at Pont-Fallwyd we were peculiarly charmed: the river ſwelled by the rain running through a deep but unequal rocky channel, was foaming againſt a huge flate rock on which we had climbed; juſt above was a lofty mountain bridge of a ſingle arch, grey with lichens, and on one ſide ornamented with ivy, while the ſteep and rough banks were feathered with thick underwood to the water's edge. The church-yard of Mallwyd is remarkable for ſeveral large yew-trees, one of which, being far ſuperior in ſize to the reſt, we meaſured. It riſes from the ground with a ſingle ſtem, but at the height of between three and four feet divides

vides into ſix large branches; the girth of the trunk a yard high, is 22 feet 6 inches, that of the ſtems a foot from the diviſion, I. 10 feet 9 inches; II. 8 feet 10 inches; III. 7 feet 8 inches; IV. 7 feet; V. 6 feet; VI. 5 feet 9 inches. The radius of the branches, which ſpread like a canopy on every ſide, is 39 feet, forming a circumference of about 240 feet. Of the ſix ſtems, four ſpread themſelves laterally, and two riſe nearly perpendicular; the height therefore from the root to the ſummit is about 40 feet: both the trunk and branches are perfectly ſound, nor does any part of the tree ſhew the leaſt ſymptom of decay, but, on the contrary, ſeems likely to go on increaſing for many years to come. We retired unwillingly to our inn, as the evening cloſed.

The next morning, having a long walk before us, we ſet off early, and following the courſe of the Dovey, ſoon paſſed the Merionethſhire border, and entered Montgomeryſhire. The difference between the two counties is ſtrongly marked in the

face of the country and the ſtate of population; the vale widens conſiderably, the mountains are leſs lofty, and green to their tops; intermixed with the paſtures are ſeveral corn-fields, the houſes and villages are more numerous, and have a greater air of comfort; the ſound of the loom begins to be heard, and tenter-grounds occaſionally make their appearance; fulling mills are ſeen upon the brooks and little rivers, and moſt of the people are able to converſe in Engliſh. We reached Machynlleth to breakfaſt, which is a well built town, of moderate ſize, the center of the woollen manufactory in this part of the country, and poſſeſſing ſome ſhare of the tanning buſineſs; it has a more flouriſhing appearance than any place we have yet ſeen in Wales. Quitting Machynlleth we ſtill kept along the bank of the Dovey, which now continues the ſouthern boundary of Merionethſhire to its mouth. After a while we began to enter the paſs through the chain of the Plinlimmon hills, which is the only north-eaſtern entrance into the county

county of Cardigan. A little further on, we aſcended a hill on the right of the road, and looked down upon a view the richeſt, moſt varied, and ſtriking, that can well be imagined. On the northern ſide appears the lofty mountainous part of Merioneth, running out into the ſea for ſome miles, bare on the ſummit, and its higheſt peaks enveloped in a light wreath of miſt, but cultivated towards the middle, and below dark with woods, which half conceal by their luxuriance four elegant villas: to the ſouth we beheld the gentle eminences and rich culture of Cardiganſhire: before us was ſtretched the calm lake-like expanſe of the Dovey, contracted towards the ſea by a rocky promontory covered with wood, advancing from Cardiganſhire, and forming in its curve a beautiful bay: immediately below the hill, a little to the left, was the trading village of Carreg, with ſeveral ſloops unlading at its wharf: under the Merionethſhire mountains, at the diſtance of four or five miles, is the port of Aberdovey, whoſe ſituation on the ſhore was

marked by a few veſſels lying in the river oppoſite to it; and ſtill further in the ſame direction, was ſeen the broad expanſe of ocean ſparkling to the ſunbeams, and enlivened by diſtant ſails. Proceeding on our journey, we entered the county of Cardigan at the village of Carreg, formerly noted for its ſmelting works, but which are now diſuſed; it however partakes with Aberdovey in the export trade of flannels, Welch-webs, bark, and other productions of the vale of Dovey. Hence we quitted the river, and proceeded ſouthwards, catching here and there fine views of the ſea through the dips of the valleys, or the cultivated intervals between the flouriſhing woods through which we paſſed. At Taly-bont the views are enlivened by caſcades guſhing from the rocks, and overhung with oaks, beeches, birches, and the mountain aſh. Beyond this place the woods give place to paſtures, corn-fields, and ſheep-walks; the hills are low and the ſtreams leſs frequent: at length we deſcended into the vale of Rhydiol, and preſently

ſently after arrived at Aberyſtwith. This was the firſt day that we had yet had free from rain. The ſun began to ſet with great ſplendour as we entered Aberyſtwith; ſo, haſtily ſnatching a ſhort refreſhment, we proceeded to the caſtle, and ſeated among the ſurrounding ruins, enjoyed at leiſure the ſcene before us. The ſea was perfectly calm, and nothing diſturbed the deep repoſe of the objects around. The ſouthern boundary of the bay of Cardigan was ſcarcely diſcerned through the duſk, but the dark bold projection of the Caernarvonſhire mountains, forming the northern horn of the creſcent, was diſtinctly viſible, in fine contraſt to the glow of evening ſtill reflected from the clouds upon the ſea, while the gentle murmur of the riſing tide alternately advancing and retiring among the caverns of the rock on which the caſtle ſtands, completed the ſoothing effect of the proſpect.

" the paſſions gently huſh'd,
" Sink to divine repoſe; and love and joy
" Alone are waking; love and joy, ſerene
" As airs that fan the ſummer."

All

All the mountains from Bala to Aberyſtwith are primitive ſchiſtus, ſometimes interſected by large veins of quartz, and of a coarſe texture, ſometimes forming ſlate; and at the head of the vale of Dovey, conſiſting principally of ſlate. Near Tal-y-bont are ſome lead mines that uſed to be very productive, but now are almoſt exhauſted; the matrix of the ore is carbonate of lime, or calcareous ſpar.

We found the *rubus idæus* very frequent by the road ſide, eſpecially in the vale of the Twrch.

CHAP.

CHAP. IV.

Aberyſtwith—Pont-y-Monach.

ABERYSTWITH, the largeſt Welſh town that we have hitherto arrived at, is ſituated on a little eminence of the ſhore at the conflux of the rivers Yſtwith and Rhydiol, about the middle of Cardigan bay. It was formerly a fortified place, and ſtill retains many ruins of a ſtrong wall, and a large caſtle or citadel boldly occupying a projection of ſlate rock, and protecting the place on the ſide of the ſea: the two rivers and a girdle of marſhy ground detach it from the ſurrounding heights; and though from theſe it may be commanded by artillery, yet previouſly to this great alteration in the art of war, Aberyſtwith might be looked upon as a fortreſs of uncommon ſtrength. At preſent it has happily loſt

its conſequence as a military ſtation, but holds a conſiderable rank among the towns of the principality, as a faſhionable place of reſort in the bathing ſeaſon, being much frequented by the Cardigan, Montgomery, and Shropſhire gentry. Its chief importance however reſts upon more ſolid grounds than the caſual influx of idle ſtrangers: the harbour is deep enough at high water to receive the larger kind of Welch coaſting veſſels, which are chiefly ſtout ſloops and cutters; by means of theſe it exports pretty largely lead and calamine, procured from the mines near Plinlimmon, oak-bark, and a few manufactured goods, ſuch as webs, flannels, and ſtockings; all which commodities are ſent for the moſt part to Briſtol and Liverpool. It imports, for the ſupply of the neighbouring country, caſt iron goods from Coalbrook dale, ſhipped at Briſtol; groceries from Briſtol chiefly; grain from Liverpool and Ireland; coals from the ſouthern counties of Wales; lime from Briſtol, and porter, of which a good deal is

is consumed in the town during the bathing season. It possesses also a considerable fishery, and sends cod, mackerel, herrings, &c. as far as Shrewsbury. A vessel of 200 tons, that we saw on the stocks, shows that *ships* may also be added to its list of exported articles: the whole of its commerce must employ a considerable number of men and vessels; we counted about thirty sloops and cutters in the river, so that it probably finds business for near 60 sail, manned with from three to five hands each. We spent here one entire day, being the first cloudless summer day that we had yet had in Wales, and found abundance of interesting objects to engage our attention. Our first care was to pay a visit to the ruins of its once formidable castle, where we had been so highly gratified the evening before: from this elevated situation we enjoyed a magnificent view of the whole extent of that line of Welsh coast which is included in Cardigan bay. This vast curve is formed by the projecting counties of Caernarvon to the north, and Pembroke

broke to the ſouth, and the coaſts of Merioneth and Cardigan fill up the centre. From Aberyſtwith, which is about the middle of the bay, we ſee to the north a long irregular line of diſtance, formed at firſt by the projecting coaſt of Merioneth, and then continued out to ſea by the long mountainous promontory of Caernarvon, terminated by the iſle of Bardſey. There is no ſituation ſouth of Caernarvonſhire, from which the Welch Alps may be ſeen to ſo great advantage as Aberyſtwith caſtle, or ſome of the ſurrounding cliffs. The lofty hills that confine the eſtuary of the Dovey, and raiſe their broad backs far above the Cardigan rocks, are ſurmounted by Cader Idris and its ſubject cliffs; theſe however are ſtill overtopped by the giant mountains of Caernarvonſhire, among which, in clear weather, the ſharp peak of Snowdon itſelf may be diſcerned pre-eminent above the ſurrounding crags. To the ſouth of Aberyſtwith, the coaſt of Pembroke being leſs curved and not ſo lofty as the northern limit of the bay, the line

line of boundary appears more uniform. This wide expanſe of water was diverſified by numerous veſſels in every direction, ſome ſteering for Pwlhelli, Crickaeth, Barmouth, Aberyſtwith, Aberdovey, Cardigan, or other ports in the bay; ſome, further out to ſea, were ſlowly urging on to reach Liverpool, or Briſtol, or ſome of the Iriſh havens; while others, almoſt ſtationary, were buſily employed in fiſhing. Northwards of the caſtle is a level beach, a few hundred yards in length, to which ſucceeds a long range of high ſlate rocks, worn into caverns and receſſes by the daſhing of the waves, and affording a ſecure abode for hawks, ravens, and various ſpecies of gulls and other ſea-birds: at the foot of theſe cliffs extends a reef of low rocks covered at high tide, the crevices and pools of which are adorned with numerous beautiful corallines and fuci, and enlivened by different kinds of ſhell-fiſh, and marine animals. In the afternoon I ſtrolled along the marſhy banks of the Rhydiol, to the ruins of a fortified man-

ſion

ſion ſituated on its ſide, and which common report diſtinguiſhes as one of the reſidences of Owen Glendwr: hence I aſcended to the ſlate quarries on the other ſide of the marſh, oppoſite the town. The ſlates here lie in alternate ſtrata of ſhale and ſlate, each ſtratum about four inches thick; the ſlate is in compact maſſes reſembling flag-ſtone, of a coarſe texture, but dividing eaſily, when quarried out, into large plates; the ſhale is the ſame ſubſtance and of the ſame appearance as the ſlate, but is broken into ſmall pieces two or three inches in length, with clay interpoſed between the laminæ: the inclination of the ſtrata with regard to the plane of the horizon follows the general irregularity of ſhale, varying even in the ſame quarry from perpendicular to parallel; whereas the rocks on the coaſt being of a coarſe of ſlate, kind and not mixed with ſhale, preſerve a perpendicular poſition of ſtrata, with very few exceptions.

The plants that we met with were Plantago coronopus and maritima, Triglochin marit.

marit. Statice armeria, Chelidonium glaucium, Cochlearia officin. Cucubalus otites, Anthyllis vulneraria.

This day (July 31) we made an excurſion to the Devil's bridge, called alſo Pont-y-Monach and Pont-y-Funach, a place about twelve miles off, and which contains ſome very ſtriking ſcenery. We ſet off early in a calm miſty morning; our road lay chiefly over the hills on the ſouth weſtern ſide of the Vale of Rhydiol: theſe however poſſeſs nothing of the grandeur of the mountains that we had lately quitted; they are moſtly cultivated and encloſed to the top, and appear to be good ſheep walks. Much ground has lately been broken up for the culture of potatoes, which in general flouriſh exceedingly on peat moſſes, the uſual covering of this ſoil. The manner of cultivating theſe moſſes is very ingenious, and to me new; the potatoe ſets are laid by line on the ſurface of the bog, a little manure is ſpread over them, and the intervals between the rows are trenched, and the earth dug out of

them laid upon the potatoes, thus at the ſame time burying the ſets and draining the land. In our way we ſaw a moor-buzzard perched on a buſh in the middle of a boggy field; it is a very voracious and deſtructive bird, and diſtinguiſhed from the reſt of the genus by its long ſlender legs. After a long and rather tedious walk we came ſuddenly on a moſt ſingularly ſtriking ſpot. The valley of the Rhydiol contracts into a deep glen, the rocky banks of which are clothed with plantations, and at the bottom runs a rapid torrent. This leads ſoon to the ſpot that we were in ſearch of, which is full of horrid ſublimity. It is formed by a deep dark chaſm, or cleft between two rocks, which juſt receives light enough to diſcover at the bottom through the tangled thickets an impetuous torrent, which is ſoon loſt under a lofty bridge. By deſcending an hundred feet we had a clearer view of this romantic ſcene; juſt above our heads was a double bridge which has been thrown over the gulph: the inferior bridge was built by a monaſtery, and hence

called

called Pont-y-Monach: this growing to decay, and being thought inſecure, another arch was thrown directly above, and reſting on the ancient one, and which now ſupports a good road acroſs the precipice. The water below has ſcooped out ſeveral deep chaſms in the rock, through which it flows, before it dives under the bridge. A large beech has flung its boughs horizontally over the torrent, as if to hide it from the ſpectator, and the whole banks of this wild ſpot are rough with fern, moſs, and native thickets, except on one ſide, where a perpendicular naked ſlate-rock lets in the light to the inmoſt receſſes. Having ſufficiently admired this tremendous ſcene, we walked along the cliffs overhanging the deep glen which receives the mingled waters of the Rhydiol and Funach, whoſe luxuriant woods almoſt concealed the numerous rapids and falls occaſioned by the ruggedneſs of its rocky bottom: midway down the glen we ſaw ſeveral

"Kites that ſwim ſublime,
"In ſtill repeated circles ſcreaming loud,"

ſkirting, with an eaſy flight, the ſides of the thickets in ſearch of prey, or floating with almoſt motionleſs wings along the windings of the vale. After a troubleſome and rather hazardous deſcent, forcing our way through the trees, and acroſs two or three headlong little ſtreams, we arrived at a rocky bank a few feet above the river, commanding a fine view of the junction of the Rhydiol and Funach, that ſeem to vie with each other in the turbulence of their waters, and the frequency of their caſcades: immediately above the union of the two torrents riſes a perpendicular rock, on the crags of which we ſaw ſeveral kites perched; the ſummit of the rock is crowned with wood equal in luxuriance to that which clothes the lofty ſides of the glen. As we returned up the rock, we ſaw ſeveral neſts of the *Formica Herculanea*, the largeſt ſpecies of ants that are natives of Britain; theſe neſts are compoſed of ſmall ends of twigs, forming a heap a yard or more acroſs, and from one to two feet high: the inſects themſelves

themſelves exceed in ſize three of the common black kind, and are poſſeſſed of uncommon ſtrength; their favourite ſituation is a wood in a light and rocky ſoil. In the afternoon we returned along the banks of the Rhydiol, at the foot of the hills which we croſſed in the morning, paſſing through a tract of rich and well cultivated land, encloſed by wooded hills and enlivened by the windings of the river; of this beautiful valley Aberyſtwith is the termination, where we arrived as the evening began to cloſe.

CHAP. V.

From Aberyſtwith to Dolgelle—30 *miles.*

Auguſt 1.

We quitted Aberyſtwith this morning, and proceeded northwards towards the eſtuary of the Dovey. The road lay behind the range of rocks that borders the bay, and afforded us but little worth notice; the land appeared to be tolerably well cultivated, but the deſerted cottages and farm-houſes that we ſaw, gave a melancholy air of depopulation to the country, loudly proclaiming to the moſt unobſervant paſſenger, that either landlord or tenant was proceeding on a bad ſyſtem. After we had walked about five miles, we arrived at the declivity of the hills that ſlope down into the vale of Dovey; a flat ſalt marſh then received us, in parts of which the

the inhabitants were mowing ſome coarſe ruſhes to ſerve inſtead of ſtraw; to the marſh ſucceeded a ſandy plain of conſiderable extent, on which were paſtured ſome fine cattle; here we found the Galium verum, Convolvulus ſoldanella, and Elymus arenarius in great plenty. The tide being out, we next croſſed a mile of ſand, in ſome places firm, in others rather treacherous, and a ferry of a quarter of a mile more landed us near Aberdovey in Merionethſhire. The view up the vale, though poſſeſſing very little beauty when compared to the proſpect from *the head of the eſtuary*, was yet highly ſtriking. Inſtead of ſeeing the broad channel of the river filled with water, as was the caſe when we firſt beheld it, a large empty flat of ſand was ſpread before us; the proſpect continually contracting, terminated in the hills; whereas before, it gradually enlarged, loſing itſelf at laſt in the ſea; and the Merionethſhire mountains, no longer enlightened by the ſun, were covered by a long deep line of threatening clouds, ſcowling on the ſubject

plain, in harſh contraſt to the ſands below. The ſcream of the ſea-gulls along this naked ſhore, harmonized well with the gloomy grandeur of the ſcene, which altogether was productive of a very ſtriking effect. On the ſand were ſeveral hillocks extending northwards, formed by the Arundo arenaria, a moſt uſeful plant on low ſhores, which fixes by its long roots the driving ſand, thus forming a barrier to the incroaching ſea: the beach was alſo here and there adorned with that rare vegetable the Pulmonaria maritima. Following the eaſy bend of the coaſt, we ſoon arrived at a conſiderable peat moſs, reaching into the ſea to an unknown extent, from which the inhabitants dig their fewel; we ſaw ſeveral large ſtacks piled up to dry, juſt above the high water mark: by the ſide of theſe, towards the land, were ſeveral marſh pools abounding with the Nymphæa alba, now in full flower. Here we quitted the ſhore, and proceeded to Towyn, through ſome rich fields covered with heavy crops of wheat, barley, oats, and rye.

rye. Towyn is a place of moderate ſize, built of coarſe ſchiſtoſe ſtone, and frequented during the bathing ſeaſon by ſome genteel families: it is ſurrounded, eſpecially towards the ſea, by ſeveral populous hamlets, and new, comfortable looking, farm houſes; the ſoil is rocky, and expoſed to the full influence of the violent weſtern gales; but all-powerful induſtry has converted the marſh into meadows and paſtures, and overſpread the ſterile rock and bleak ſhore with waving corn, now nearly ripe. After dinner, notwithſtanding the threatening appearance of the ſky, we ſet out for Dolgelle, 18 miles diſtant. We made choice of the lower road, or, that which paſſes the ſouthern ſide of Cader-Idris, in preference to the upper one, which, though ſhorter, is not nearly ſo intereſting. About three miles from Towyn we croſſed the little river Mathew, and proceeded up the narrow valley through which it flows; the mountain on the left was covered with underwood to nearly its ſummit; and in one part was agreeably di-

verſified by a long curling line of blue ſmoke proceeding from ſome large ſtacks of wood, making into charcoal. We paſſed the ſource of the Mathew, and at the little village of Abergynolwyn found ourſelves on the bank of the river Diſynwy, with the ſteep aſcent of Cader Idris in full view, riſing out of the woods that root themſelves on his baſe. The mountains now on both ſides ſoar to a vaſt height, become more craggy, and approach ſo near to each other, as almoſt to ſhut up the vale. At length we came to Talyllyn, a piece of water above a mile long, and occupying the whole bottom of the valley. As we were coaſting this lake by a rough mountain road, the clouds deſcended from the tops of the mountains, and rolling on in immenſe volumes, at length reſted on the lower cliffs, covering the glen like a dark ceiling: the idea impreſſed on the mind by this ſublime ſcene, was that of being in a vaſt priſon, incloſed on all ſides ſo as to prevent the poſſibility of eſcape, while the cold reflection of the clouds from

the lake heightened inconceivably the ſenſation of deſolate ſolitude: only three great objects compoſed the ſcene, the watery floor, the rocky walls, and the cloudy roof, and each added to the other a double horror. The evening was now cloſing faſt, the wind began to riſe, and all this mighty congregation of clouds let fall their contents in cataracts of the heavieſt rain that we had ever experienced; the roar of the torrents was ſoon heard on all ſides, the little ſtreams that croſſed the road ſuddenly ſwelled to rapid and dangerous fords, and it was not without ſome hazard, in ſo dark and tempeſtuous a night, that we purſued our journey. Sometimes a ſudden ſquall would tear a large opening in the clouds and let in a glimmer of light, juſt enough to perceive the black gigantic outlines of the impending precipices, or the white foam of ſome nameleſs torrent tumbling headlong into the capacious bed of the main ſtream that accompanies the road. A difficult aſcent at laſt carried us ſafely out of the glen, the night became lighter,

and

and the rain, though ſtill pouring down with vehemence, was ſomewhat abated; encloſed fields now bordered the road, and the frequent cottages encouraged us to hope that the end of our journey was faſt approaching. Our impatience however deceived us, and we had nearly three tedious miles to go, after reaching what we fully expected was the out-ſkirt of Dolgelle, and miſtaking frequently the glow-worms in the hedges for lights in the town. The glow-worms were this night unuſually luminous, and I was not a little ſurpriſed to ſee them at our approach darting over the hedges into the fields; knowing the female alone to be luminous, and at the ſame time deſtitute of wings, this phenomenon puzzled me a good deal, nor can I account for it except upon the ſuppoſition of the male bearing the female through the air when in the act of copulation. At length between ten and eleven o'clock we reached Dolgelle, and ſeated by a blazing fire, quickly forgot every unpleaſant circumſtance in this day's walk.

CHAP.

CHAP. VI.

Cader Idris.

THE day being promiſing, we ſet off after breakfaſt to examine Cader Idris. A ſmall lake, called Llyn-y-gader, lies about a mile and a half on the high road to Towyn, which having arrived at, we quitted the road and began our aſcent up the firſt ſtep of this lofty mountain. When we had ſurmounted the exterior ridge, we deſcended a little to a deep clear lake, which is kept conſtantly full by the numerous tributary torrents that fall down the ſurrounding rocks. Hence we climbed a ſecond and ſtill higher chain up a ſteep but not difficult track, over numerous fragments of rock detached from the higher parts: we now came to a ſecond and more elevated lake, clear as glaſs, and overlooked

overlooked by ſteep cliffs in ſuch a manner as to reſemble the crater of a volcano, of which a moſt accurate repreſentation is to be ſeen in Wilſon's excellent view of Cader Idris. Some travellers have mentioned the finding lava and other volcanic productions here; upon a ſtrict examination however we were unable to diſcover any thing of the kind, nor did the water of the lake appear to differ in any reſpect from the pureſt rock water, though it was tried repeatedly with the moſt delicate chemical teſts. A clear, loud, and diſtinct echo, repeats every ſhout that is made near the lake. We now began our laſt and moſt difficult aſcent up the ſummit of Cader Idris itſelf, which when we had ſurmounted, we came to a ſmall plain with two rocky heads of nearly equal height, one looking to the north, the other to the ſouth: we made choice of that which appeared to us the moſt elevated, and ſeated ourſelves on its higheſt pinnacle, to reſt after a laborious aſcent of three hours. We were now high above all the eminences

nences within this vaſt expanſe, and as the clouds gradually cleared away, caught ſome grand views of the ſurrounding country. The huge rocks which we before looked up to with aſtoniſhment, were now far below at our feet, and many a ſmall lake appeared in the vallies between them. To the north, Snowdon with its dependencies ſhut up the ſcene; on the weſt we ſaw the whole curve of the bay of Cardigan, bounded at a vaſt diſtance by the Caernarvon mountains, and nearer, daſhing its white breakers againſt the rocky coaſt of Merioneth. The ſouthern horizon was bounded by Plinlimmon, and on the eaſt the eye glanced over the lake of Bala, the two Arennig mountains, the two Arrans, the long chain of the Ferwyn mountains, to the Breddin hills on the confines of Shropſhire; and dimly, in the diſtant horizon, was beheld the Wreakin riſing alone from the plain of Salop. Having at laſt ſatisfied our curioſity, and being thoroughly chilled by the keen air of theſe elevated regions, we began to de-

ſcend

ſcend down the ſide oppoſite to that which we had come up. The firſt ſtage led us to another beautiful mountain lake, whoſe cold clear waters diſcharge their ſuper-abundance in a full ſtream down the ſide of the mountain; all theſe waters abound with trout, and in ſome is found the Gwyniad, a fiſh peculiar to rocky alpine lakes. Following the courſe of the ſtream, we came on the edge of the craggy cliffs that overlook Talyllyn lake; a long and difficult deſcent conducted us at laſt on the borders of Talyllyn, where we entered the Dolgelle road.

The mountain of Cader Idris, in height the ſecond in all Wales, riſes on the ſea ſhore, cloſe upon the northern ſide of the eſtuary of the ſmall river Diſynwy, about a mile above Towyn. It proceeds with almoſt a conſtant aſcent, firſt northwards for about three miles, then for ten miles further runs E. N. E. giving out from its ſummit a branch nearly three miles long, in a ſouth weſterly direction, parallel

parallel to the main ridge. It is very ſteep and craggy on every ſide; but the ſouthern deſcent, eſpecially to the border of Talyllyn lake, is the moſt precipitous, being nearly perpendicular. Its breadth bears but a ſmall proportion to its length; a line paſſing along its baſe and interſecting the ſummit, would ſcarcely equal four miles and a half; and in the other parts it is a mere ridge, whoſe baſe hardly ever exceeds one mile in breadth. The peak is ſaid to be 2850 feet above Dolgelle *. Cader Idris is the beginning of a chain of primitive mountains, extending in a N. N. Eaſterly direction, and including the Arrans and the Arennigs. It is much loftier and more craggy than the ſlates and ſecondary mountains which ſurround it, and conſiſts of,

I. Siliceous porphyry in maſs; interſected by veins of quartz.

The quartz and felſpar are incloſed in a greeniſh paſte, compoſed of iron, argil,

* Vide Pennant's Snowdonia, p. 89.

and mica, which by expoſure to a red heat becomes of a dull red purple. This ſtone is very compact, has a moderately fine grain, and exhales an earthy ſmell on being breathed upon: does not effervesce with acids.

II Siliceous ſchiſtoſe porphyry, interſected by veins of quartz.

Of a purple fleſh colour, with a remarkably fine grain, owing to the large proportion of quartz which it contains: the paſte of this porphyry conſiſts of argil and iron. The felſpar is in ſmall oblong grains, ſtratifying almoſt in regular alternation with long ſlender pieces of quartz. The mica is of a golden yellow, and is diſtributed through the felſpar, quartz, and paſte, indiſcriminately. Were it not for the paſte, which is in ſmall quantity, this ſtone would nearly anſwer to Kirwan's *gneiſs*. It emits, when breathed upon, a faint earthy ſmell; by expoſure to a red heat its colour is conſiderably heightened. Does not effervesce with acids.

III. Argillaceous porphyry, in maſs.

With

With a dark grey paſte, fracture earthy, and emits a ſtrong earthy ſmell when moiſtened, the paſte bears a greater proportion to the quartz, felſpar, and mica, than in the preceding ſpecies. It oxidates on the ſurface by expoſure to the air, and when ſubmitted to a red heat becomes liver coloured. Does not effervesce with acids.

IV. Granitell (of Kirwan) in maſs.

Compoſed of quartz and ſchorl.

Beſides the ſpecies already mentioned, are found ſeveral rocks containing the component parts of granite and porphyry, but with ſo great a proportion of white, and ſmoak-coloured greaſy-looking quartz as almoſt to conceal the other ingredients. In ſeveral ſpecimens the felſpar, having been decompoſed, has fallen out and given the quartz a porous appearance; which accounts for the porous lava ſaid by ſome travellers to have been found here.

There are no mines in Cader Idris, or the neighbourhood.

The plants that we found were *Lobelia*

Dortmanna, in all the lakes, especially in Llyn-y-gader; *Saxifraga hypnoides*; *S. nivalis*; *Lycopodium selago*; *L. clavatum*; *Festuca vivipara*; *Vaccinium vitis-idæa*; *Gnaphalium dioicum*; *Pteris crispa*; *Narthecium ossifragum*; *Pinguicula vulgaris*; *Sedum rupestre*; *S. telephium*; *&c.*

CHAP.

CHAP. VII.

On the woollen manufactures of North Wales *.

It is not my intention, neither, were I ſo inclined, am I in poſſeſſion of the proper documents, to give a regular *hiſtory* of the riſe and progreſs of the Welſh woollen trade; I flatter myſelf however that I ſhall be able to lay before the reader ſeveral intereſting particulars relative to the *preſent* ſtate of the manufactures; I mention only *particulars*, becauſe my materials will not warrant me in drawing general reſults; and even the collecting of theſe has been by no means eaſy, on account of the jealouſy and ſhyneſs of thoſe concerned in the trade. The irregular confuſed manner in which the tranſactions between the merchant and manufacturer are conducted,

* Communicated by a friend.

the want of cloth-halls, as in Yorkſhire, where to depoſit the goods; of general meetings for thoſe engaged in the buſineſs, for the regulation of its concerns; of accurate public accounts; and the ſcarcity of factories, and regular markets, render it almoſt impoſſible to come at thoſe *general* facts, an acquaintance with which is abſolutely neceſſary to enable a perſon to ſpeak decidedly, on the magnitude and importance of the trade as a national concern.

The different articles of manufacture are webs, flannels, ſtockings, wigs, gloves, and ſocks.

Webs are diſtinguiſhed by thoſe in the trade into two ſorts, I. what they call *ſtrong cloth*, or *high-country cloth*; II. *ſmall cloth*, or *low-country cloth*.

I. Strong cloth is made in Merionethſhire, and principally in the neighbourhood of Dolgelle and Machynlleth: at this latter place a manufactory on a ſmall ſcale has lately been eſtabliſhed, a circumſtance only worth notice as marking the commencement

ment of a change in preparing the wool, which will probably ſoon become general. Almoſt every little farmer makes webs, and few cottages in theſe parts are without a loom; all kinds of wool are uſed indiſcriminately, and a conſiderable quantity of refuſe from the wool-ſtaplers and ſkinners is collected from all quarters for this purpoſe. During peace much Kentiſh wool uſed to be imported. Many farmers however employ wool of their own growth, and this produces by far the beſt kind of cloth. The ſtandard width of this article is $\frac{7}{8}$ yard; the length of a piece, or what is emphatically ſtyled a *web*, is about 200 yards: this conſiſts of two ends, each 100 yards, thus divided for the conveniency of carriage. The quality is neceſſarily of various degrees. The price during the laſt year has been rapidly advancing, and has added to the former value of the article, 3, 4, or 5 pence per yard. In its rough ſtate, it may at preſent be purchaſed of the manufacturer at every price between 11

and 20 pence. The market for this cloth is Shrewſbury: it was actually the market a few years ago, but is now little more than nominally ſo. A market however is regularly held every Thurſday, in a great room belonging to the Drapers company, into which none but the members of that corporation are admitted. To this monopoly is to be aſcribed the removal of the market from Shrewſbury, as perſons not of the fraternity, but who purſued the ſame trade, intercepted the cloth in its way to the town; ſo that the drapers themſelves, whenever trade is briſk, are obliged to *go up into the country*, (as the phraſe is) and buy goods wherever they can find them; at Dolgelle, at Machynlleth, at the villages, farm-houſes, cottages, or fulling-mills. In conſequence of this it is now become a cuſtom with the principal drapers to keep ſervants the greater part of the year at Dolgelle or its neighbourhood, who get acquainted with the perſons who make cloth, aſſiſt the poorer ones probably

bly with ſmall ſums of money to purchaſe wool, and, in fact, ſuperintend the making and dreſſing of the goods.

The following is the whole proceſs undergone by this article before exportation. The wool is prepared by hand in the uſual manner for the loom; when woven into cloth it is ſent to the fulling-mill, where it undergoes the operations of ſcouring, bleaching, and milling; and is then fit for the market. When purchaſed by the drapers, it is treated in various ways; either it is merely committed to the ſhearmen, who raiſe the wool on one ſide with cards, which is called *rowing*; or it is ſent again to the mill, where it is ſometimes thickened to a ſurpriſing ſubſtance, which adds greatly to the price on account of the loſs in ſhrinking; or it is ſtretched, and thus made three or four inches wider, an operation that conſiderably enhances its value; or, laſtly, it is converted into a frieze or napped cloth. It is then put under the packing preſs. Being formed into bales of different ſizes, containing from 500 to 2000

2000 yards, it is uſually ſent either to London or Liverpool *, whence it is exported to Holland, Germany, and America. A quantity comparatively inconſiderable, is uſed at home for workmen's jackets, ironing-cloths, blankets, &c.

II. *Small cloth* is the produce of Denbighſhire. It is entirely manufactured within the pariſh of the Glynn, a large tract of country including Llangollen and Corwen. There is no eſtabliſhed factory for this article. Small cloth is about $\frac{1}{9}$ yard narrower than ſtrong cloth; its length is the ſame. The beſt was purchaſed laſt year at about 16 or 17 pence per yard, but this was thought a moſt extravagant price, 14 pence having formerly been deemed its full value. This cloth is uſed chiefly for dying. Some quantity is indeed ſent off in its native or white ſtate,

* An abortive attempt was made a few years ago to eſtabliſh a warehouſe at Barmouth, and raiſe that port into conſequence by making it the grand depot of thoſe woollen goods that were to be exported.

but

but all that is dyed is, or ought to be, of this kind; the reaſon of which is that the coarſer ſort of the high country cloth abounds with long white hairs incapable of taking the dye, called *kemps*. This fabric is made of the coarſer part of the very long wool that grows round Oſweſtry. Of this wool the finer part is converted into a ſort of flannel called *Oſweſtry flannel*, in ſubſtance between a common Welſh flannel and a web; its breadth is $\frac{3}{4}$ yard; its value from 10 to 15 pence at Oſweſtry, which is the market for this article, as well as for Small-cloth. There is no hall or other building at Oſweſtry, appropriated to the ſale of woollens; but the cloths are conveyed by the venders into any garret, ſtable, parlour, or kitchen, that they can procure, and the purchaſers hunt them out as well as they are able: the market is however confined to one or two ſtreets. The purpoſes to which webs are applied abroad are various; the clothing of the ſlaves in the Weſt Indies and South America creates a large demand; ſtockings

ſtockings are ſaid to be made of them in Germany, and other parts of the continent; and the late Empreſs of Ruſſia at one time clothed part of her troops with them.

But flannels conſtitute the grand and moſt important of the Welſh manufactures. The texture and uſes of this comfortable commodity it is unneceſſary to point out. It is chiefly the produce of Montgomeryſhire, but by no means confined to this county, being made in various places within a circle of about twenty miles round Welſh-Pool. There is only one manufactory of note in this line in Wales: it is at *Dolobran* near Pool, and is ſaid to be a pariſh concern; it has been eſtabliſhed about ſeven years. There are a few other infant factories at Newtown, Machynlleth, and other places, but as yet of little conſequence. The adjoining county of Shropſhire partakes with Wales in this capital manufacture, and being more wealthy, has in general ſubſtituted machinery to manual labour: ſeveral individuals

viduals in Shrewſbury and its neighbourhood, employ themſelves ſucceſsfully in this buſineſs; but by far the greateſt undertaking of the kind is a factory about four or five miles from Shrewſbury, at a place called the *Iſle*, belonging to Meſſrs. Cooke and Maſon, and erected three years ago. The mill is ſituated on the neck of a horſe-ſhoe-like winding of the Severn, whoſe diameter is about three hundred yards, whereas the river makes a ſerpentine courſe of nearly three miles before it arrives, from the upper part of the iſthmus, at the lower: a tunnel five feet in diameter is worked through the neck, opening into the bed of the upper part of the river, and a great water wheel is placed at the other extremity: this wheel communicates motion to a vaſt ſeries of machinery for ſpinning, fulling, and many other operations. The power that works the wheel is immenſe; being a ſolid cylinder of water, five feet in diameter, with a fall more than ſeventeen times greater than that of the Severn, which is itſelf a rapid

rapid river. Various were the apparent difficulties, and numerous the unforeſeen accidents, which combined to baffle the deſign, ariſing from floods, and a bed of looſe ſand lying in the direction of the tunnel; all theſe, however, have been at length overcome by the perſeverance and great mechanical ſkill of Mr. Maſon; and the ſucceſs of the undertaking bids fair to be as complete, as in its execution it was arduous.

As yet by far the greater part of the thouſands of pieces of flannel which are annually ſold at Pool, is the produce of manual labour; but the uſe of machines increaſes, and will ſpeedily become general. Formerly the Welſh beſtowed no pains in ſorting the wool; a fleece was broken into two parts, never into more than three: they have now however learnt the economy of a little more trouble, and can make diſtinctions of ſorts to the number of ſeven or eight: the conſequence is a great variation in the texture of flannels, and ſome have been ſold as low as ſixpence,

pence, while others have been diſpoſed of at four ſhillings per yard. Coarſe goods are at preſent very ſcarce, and extravagantly dear, none being to be had under 11 or 12 pence per yard. The market at Pool is once a fortnight, on Monday. Each manufacturer uſed to bring hither his own goods, but of late a ſet of middle men has ſprung up called Welſh drapers, a ſort of jobbers or foreſtallers, who go about the country to the different cottages, and buy all the flannel that they can lay their hands upon. Their number increaſes, and with it the price of flannel, ſo that ſhortly the whole trade of ſelling at the market will be in their hands. Theſe men generally have large lots of cloth, from eight to twenty pieces, each 100 yards on an average, out of which they will not ſell a *ſingle* piece but at an advanced price, by which means they get rid of many ordinary and damaged articles. At this market nothing is bought upon credit, every piece being paid for as ſoon as

as meaſured, in hard caſh, or bank notes: it is the ſame with webs, and the reſt of the Welſh woollen manufactures; whoever purchaſes muſt depoſit the value in ready money, and pay the carriage home of the goods bought. No calculation has been made of the number of yards manufactured, nor indeed is it conjecturable *. Very little flannel is immediately exported by the Shrewſbury drapers, who, for the moſt part, ſell their goods to the London merchants: by theſe, flannels, as well as other woollens, are ſent to the continent, to America, and the Weſt Indies: the chief demand however is inland. It is impoſſible to tell the number of pieces exported, except by inquiries at the ports; for though each draper may know the pro-

* Mr. Pennant, in his Snowdonia, p. 397, publiſhed in 1781, mentions that there are brought annually to Salop 700,000 yards of webs; and to Welſh Pool annually, between 7 and 800,000 yards of flannel; but he does not ſtate the particulars whence he deduces this general eſtimate.

portion exported of his own goods, yet no one is acquainted with what his neighbour exports.

Flannels, and cloths, i. e. webs, are dyed of various colours; but not in Wales, except what is conſumed at home; and indeed it is ſeldom that a Welſhman (among the lower claſſes) wears a coat that is not made in the principality: the uſual colours are blue, drab, brown, or mixed. Conſiderable quantities are dyed in Shrewſbury, and there is a dye-houſe at Le-Botwood near Dorrington, chiefly for this purpoſe. Some flannels alſo have been ſent into Lancaſhire, or the borders of Yorkſhire, to be dyed; but this is by no means a common practice. More webs than flannels are dyed; but of the webs, far more are ſent off *in the white*, than *in colours*.

As to the *fulling-mills*, there is nothing peculiar in their conſtruction; it may however be remarked that the *ſtocks* or hammers are not ſo heavy for flannels as webs.

Stockings, *wigs*, *ſocks*, *gloves*, and other ſmall knit articles, are ſold chiefly at Bala*, being made in the town and neighbourhood; they are generally purchaſed by Welſh hoſiers, who travel through the adjoining Engliſh counties, and ſupply the ſhops and warehouſes; from the latter they are diſperſed through the iſland. Stockings are of all colours, greys of a thouſand ſhades, white, blue, red, &c. from ſix to nine ſhillings per dozen.

Welſh wool is brought to Monmouth and Shrewſbury fairs, where the ſtaplers attend from different parts. Much is purchaſed by the Yorkſhire clothiers, but the Radnorſhire wool, and ſome other coarſer ſorts, being very *kempy*, is not fit for their purpoſe. Whether the Welſh manufacturers conſume a quantity of wool, equal to the whole of their growth, is not aſcertained; it is however certain that a great

* The market here is every Saturday, when from two to five hundred pounds worth of ſtockings are ſold each day, according to the demand. PENNANT's Snowdonia, p. 67.

interchange

interchange of wool takes place between England and Wales; and upon the whole, it is probable that more wool is ſent out of Wales, than is imported into the principality.

From the foregoing ſtatement it appears, that, owing to the increaſed demand for Welſh-woollens, and the competition ſubſiſting between the ſeveral drapers in Shrewſbury, the trade is greatly in favour of the Welſh; they have been enabled to raiſe the price of their goods, receive ready money for every yard that they ſell, and are ſpared in a great meaſure the trouble and expence of conveying their manufactures to the Engliſh markets. The ſcanty population even of the manufacturing diſtricts, and the admirable ſituations for mills, afforded by their numerous ſtreams, ſtrongly indicate the advantages and neceſſity of ſubſtituting machinery for manual labour; with the general adoption of machines, the manufacturers will become large capitaliſts, as is already the caſe in Lancaſhire and Yorkſhire; and the influx

of money will enable the farmers to improve their breed of ſheep, and beſtow ſome culture on the extenſive mountainous tracts that, as yet, have been committed to the care of nature alone. The preſent infant factories contain the rudiments of future proſperity; one ſucceſsful effort will produce many other vigorous exertions; the manufacturers, become rich, will not abandon to the Engliſh drapers the advantages of preparing their rough goods for the foreign and domeſtic markets; nor to the London and Liverpool merchants, the profits of exporting them; and though one attempt to erect Barmouth into a magazine for ſupplying foreign markets with Welſh manufactures, has failed, a ſecond may ſucceed; and thus the whole profits of an extenſive national concern will circulate through, and invigorate every part of the province where it originates.

CHAP.

CHAP. VIII.

From Dolgelle to Beddgelert, 40 miles.

August 5.

We took leave of Dolgelle this morning, and proceeded about four miles down the river to a forge; in our way we paſſed Llaneltid, a flouriſhing village, containing ſeveral good houſes, beautifully ſituated on the river Mawddach, or Maw: it ſerves as a port to Dolgelle, and a good many ſmall veſſels are built here. We ſaw a ſtout brig of 168 tons on the ſtocks, and one of 210 tons had been launched a little before. Theſe larger veſſels however are unable to get out of the ſhallow paſſage from Cardigan bay to Barmouth harbour, except by taking advantage of the equinoctial tides. At this place alſo we met a large pleaſure boat on wheels, proceeding

ſlowly to Bala-pool, for the uſe of Sir W. W. Wynne. On the river ſide are many lime-kilns, in which the hard ſtone lime is chiefly burnt; but in ſome we ſaw a number of cockle-ſhells calcining, which furniſh an excellent lime for manure. Proceeding ſtill down the river, we juſt paſſed the forge, and came upon a proſpect which, for beauty and pictureſque effect, can ſcarcely be equalled. The wide eſtuary of the Mawddach was before us, filled by the tide, and enlivened here and there by a barge or pleaſure boat; the banks on each ſide run out alternately in ſteep promontories, wooded to the water's edge, ſo as completely to hide the termination of the river, and cauſe it to reſemble a broad and beautiful lake; while on the ſouth from behind the banks roſe abruptly the vaſt and craggy cliffs that ſurround, and almoſt conceal, the ſummit of Cader Idris. Leaving reluctantly this delightful ſpot, we returned to Llaneltid, whence our road led us northwards up the vale of the Maw. The river here aſſumes the character of a wide

wide mountain torrent, leaping over the inequalities of its rocky channel, and ſhaded by the fine hanging woods of Nanney-park, that overſpread the ſteep declivity of the rocks on our right, with their deep and varied foliage. At Pont-ar-Ganſa, or the union of the Ganſa with the Maw, and Pont Eden, where the Auduon mixes with the Maw, are beautiful caſcades; theſe however are only introductory to the ſcenes of grandeur and beauty which are ſo profuſely diſtributed about two miles higher up the Maw, reſembling conſiderably, though far ſuperior in kind, the romantic views about the Devil's-bridge. Having croſſed a lofty flate mountain, we deſcended towards the river, and following a wild path ſometimes hidden among trees, at other times ſkirting the edge of the wood, arrived at length at Piſtyll Cain. This is a ſingle ſheet of water, conſiſting of the whole current of the river Cain, which daſhes down in a full ſtream into a deep and rocky baſon, and when ſeen from below appears a very magnifi-

cent object; the water falls into a deep glen with ſteep rocky ſides, ſhaded by old oaks, crowned with pendent birches, and interſperſed with young trees, and a profuſion of thick underwood, planted in a very happy ſtyle of ſtudied negligence. From Piſtyll Cain a walk of two or three hundred yards brought us full upon the neighbouring fall of the Mawddach, which is much in the ſame enchanting ſtyle, but is more open to the day, and the water falls in a fuller ſtream, forming two noble cataracts before it loſes itſelf in the thickets below. On the whole we were as highly gratified with theſe waterfalls as with that of Piſtyll Rhaiadr, though the character of each is eſſentially different; that of the latter being ſtupendous and magnificent; but of the former, wild and romantic.

In aſcending from theſe lovely ſcenes we miſſed the way, and loſt ourſelves on the mountains which fill up the dreary ſpace of the interior of Merioneth; at length however we recovered the road, and paſſing through Trawsfynydd, a large village

village ſituated in an open barren country, arrived by the cloſe of the evening at Tan-y-bwlch, where we halted for the night.

Tan-y-bwlch is ſituated in the vale of Feſtiniog, a ſmall though very rich tract, ſcarcely three miles long, and not exceeding one in breadth; the village of Maentwrog occupies the middle of it, but the vale derives its name from the village of Feſtiniog, which is ſituated on the hill at the head of the valley. It is watered by a multitude of ſmall ſtreams that fall from the hills on every ſide, and diſcharge themſelves into a beautiful ſmall river that winds along their feet; this river at the bottom of the valley receives the tide, and expands into a wide lake-like channel called Traeth Bychan, whence it flows through the ſandy eſtuary of Traeth Bach, and ſo into Cardigan bay. The hills on both ſides of the valley are well wooded, but the northern boundary being the beſt ſheltered, is more eſpecially ſo. It is on the north weſtern extremity of the valley, on a riſing

a rising ground just above Traeth Bychan, that Tan-y-bwlch hall is situated, in the midst of a fine wood that climbs the steep rocks behind the house, and waves to the breeze high above the top of the building

From Tan-y-bwlch to Beddgelert, the distance by the road is no more than eight miles, of which the greater part is not very interesting; we therefore determined to explore the windings of the coast, and found great reason to be satisfied with our deviation from the direct way. Quitting our inn therefore, we proceeded beneath the woods that embower the hall to the edge of Traeth Bychan, which being perfectly land-locked and bounded by steep cliffs, seems a fine lake beautifully bordered by a line of woods extending from the hall. After walking above a mile on its banks, we ascended from the Traeth in a north westerly direction, and from an elevated part of the road, came suddenly upon a grand view of Traeth Mawr, Traeth Bychan, and Bach, the entrance of Festiniog

Feſtiniog vale, ſome lofty mountains in the vicinity of Snowdon, and Harlech caſtle, which, though four miles diſtant, was brought near the eye by a light miſt that hung in that quarter, and made a very conſpicuous figure in the landſcape. Hence we proceeded through the ſcattered and populous hamlet of Minfordd, to the edge of Traeth Mawr, and then croſſed a large extent of ſalt marſhes covered by the ſea at high water: at the extremity of theſe we forded a river, and once more getting on dry land, walked, rather uncertain of our way, through many fine meadows, till we arrived at Pont-Aberglâſlyn. Pont-Aberglâſlyn is a bridge over the main ſtream that diſcharges itſelf into the eſtuary of Traeth Mawr, and is the only entrance by the ſouth into Caernarvonſhire: the paſs is ſo narrow as only to admit the river and a road juſt wide enough for horſes and foot paſſengers; it is bounded on both ſides by cliffs abſolutely perpendicular, and ſeems to have been

been worn through to its preſent depth by the action of the water. Under the bridge is a fall formed by a ledge of rock, which is remarkable for being a ſalmon leap; we were not however fortunate enough to ſee any of the fiſh attempting to force their way up. Some ſhafts from a copper mine open into this paſs, from one of which flows a conſtant ſtream of water, ſtrongly impregnated with ſulphat of copper and iron; this being ſuffered to fall into the river, muſt, I imagine, conſiderably injure the fiſheries, particularly in dry ſeaſons. The little village of Beddgelert ſtands upon the river about a mile above the bridge, ſurrounded by lofty mountains, of which thoſe to the north are the higheſt, being the commencement of that mountainous diſtrict of which Snowdon is the centre.

The rarer plants that we met with this day, were *Nymphæa alba*, in marſh pools on the ſhore of the Traeths; *Oſmunda regalis*, *Myrica gale*, on a bog near Pont-Aberglâſlyn; *Ruppia maritima*, in the pools and

and ditches of the marſhes covered by the tide. Of this plant the fruit-ſtalks are formed by an elaſtic ſpiral line, contracting or elongating itſelf according to the depth of the water.

CHAP.

CHAP. IX.

Snowdon.

August 7.

THE day appearing favourable, we ſet out this morning to aſcend Snowdon; it being Sunday we were unable to procure a guide, but, well apprized of the ficklenéſs of the weather, we did not chooſe to let ſlip the favourable opportunity which now offered for our expedition. About five miles from Beddgelert, near the ſecond lake on the road to Caernarvon, we quitted the highway, and began to aſcend the mountain by an eaſy though circuitous road; we found no difficulty except what aroſe from the heat of the day, and the boggy texture of the lower region of Snowdon. A vaſt number of black cattle and ſheep find paſturage on the ſides

of this and the adjoining mountains, roving wherever their inclination leads them, attended by no keepers, and confined by no fences. The liberty which they enjoy renders them very intereſting objects, as their natural inſtincts and propenſities are allowed full ſcope, being obliged in a great meaſure to have recourſe to their own exertions for ſubſiſtence, and ſecurity from the foxes and birds of prey. The ſheep, in particular, have all the air of a wild animal; inſtead of congregating in flocks, they graze in parties of from eight to a dozen, of which one is ſtationed at a diſtance from the reſt, to give notice of the approach of danger: when the centinel deſcries any one advancing, at the diſtance of two or three hundred yards, he turns his face to the enemy, keeping a watchful eye upon his motions, allowing him to approach as near as eighty or a hundred yards; but when the ſuſpected foe manifeſts a deſign of coming nearer, the watchful guard alarms his comrades by a loud ſhrill hiſs or whiſtle twice or thrice repeated,

ed, when the whole party inſtantly ſcour away with great agility, always ſeeking the ſteepeſt and moſt inacceſſible parts of the mountain. We made the experiment ſeveral times, and with different ſets of ſheep, and uniformly found in all the ſame expreſſion of wildneſs.

In proportion as we continued to aſcend, the ſurrounding hills appeared of leſs and leſs conſequence in the landſcape, and the diſtant horizon opened upon us with great ſplendour. The iſle of Angleſea appeared full in view, ſeparated from the main land by the narrow ſtrait of the Menai, but we were diſappointed by obſerving the clouds thicken around the lofty ſummits of the adjoining mountains. In aſcending ſtill higher the proſpect became more and more obſcured, and after a while we plunged into a body of clouds that were reſting around the ſummit, and entirely obſcured every object only a few yards diſtant. We had ſtill a great height to aſcend, but found no difficulty, the riſe being ſufficiently gradual, and the rude heaps

heaps of rough ſtones affording a very firm and ſecure footing. When we had reached the very top of the mountain not a ſingle object could be diſcovered through the thick miſt. The wind was high, and the cold ſo piercing, as to make us take ſhelter behind a huge projecting cliff, where we waited a full hour in hopes that the proſpect would brighten upon us—but in vain. Juſt above our heads was ſpread a light thin miſty cloud, which was every now and then penetrated by the ſun-beams; and ſometimes a violent guſt would ſweep it away altogether, and diſcover beneath our feet a confuſed ſcene of cliffs, valleys, and lakes, and then another thick cloud would again bury every thing in impenetrable obſcurity. We at length found that it would be in vain to wait longer, and began to deſcend about an hour after we had reached the ſummit.

The county of Caernarvon, from Bardſey iſland in a north-eaſterly direction, to the promontory of Penmaen-bach in Conway bay, is occupied by a range of moun-

tains the higheſt of any in Wales. They gradually aſcend from each extremity of the chain towards the centre, which is occupied by Snowdon, the loftieſt of all. The general eſcarpement fronts the ſea, while the particular eſcarpement of individuals, or detached groupes, depends upon the courſe of the ſtreams. The maſs of rock that goes under the name of Snowdon, is compoſed of various cliffs of different heights, riſing one above the other; and even the peak itſelf of Snowdon ſcarcely out-rivals ſeveral of the more lofty ſummits that ſurround it on all ſides; the altitude of the higheſt point of the mountain is about 3600 feet from the high-water mark on Caernarvon quay. The derivation of the name is evident, and it has been ſaid, though erroneouſly, that ſnow is to be found all the year round in the hollows near the top of the mountain: the firſt ſnow that appears on it is uſually about the beginning of November, and it is ſeldom entirely melted till the firſt or ſecond week in June. Even in the middle

of

of ſummer, however, the temperature of the ſummit of Snowdon is very low. On the morning of July 5, 1795, juſt after ſun-riſe, I obſerved the thermometer at 34°; and at one in the afternoon this day it ſtood at 48°, while in the vale of Beddgelert, at ſeven in the morning, it was as high as 62°. The greater part of the rocks compoſing the Caernarvonſhire mountains are ſchiſtoſe hornblende, ſchiſtoſe mica, granite, and porphyry, (vid. Kirwan Mineralog.) incloſing conſiderable blocks of quartz. The weſtern ſide, by which we deſcended, is very precipitous, conſiſting of hornſtone, upon which are placed a number of baſaltic columns, more or leſs regularly pentagonal, ſtanding perpendicularly to the plane of the horizon. The columns are of different lengths, about four feet diameter, with tranſverſe joints from ſix to eight feet aſunder, and conſiderable depoſitions of thin laminated quartz in the joints.

The plants and animals are in general

the ſame as are found on Cader Idris, with the addition of *Myrica gale* in the lower boggy parts. The eagle too is an occaſional viſitant of the loftieſt crags; and amid the thickeſt of the clouds that we found on the ſummit, we diſcovered three ring-ouzels.

CHAP.

CHAP. X.

From Beddgelert to Llanrwſt, 20 miles.

Auguſt 8.

NOTWITHSTANDING that it rained hard and had every appearance of continuing a wet day, we ſet out for Yſpytty Evan. Indeed we now conſider ourſelves as independent of the elements, having been expoſed almoſt every day ſince we ſet out, to ſhowers uncommonly heavy, even in this the native country of ſtorms and miſts, and "all the wat'ry turbulence of heaven." Our road lay under the ſkirts of Snowdon, along a valley to the north-eaſt, attending the courſe of the river that we croſſed before at Pont-Aberglâſlyn. A little way off the village is a rude alpine bridge thrown acroſs the torrent to a water-mill on the other ſide, which, with

the neat chapel of Beddgelert, about a quarter of a mile lower down the ſtream, forms a very pleaſing view, and is moſt accurately expreſſed in one of the plates to Mr. Pennant's Welſh tour. We had ſcarcely proceeded two miles, when our attention and admiration were powerfully excited by an immenſe cataract a little on our left, which burſt out of the cloudy ſide of a ſteep mountain, precipitating itſelf all white with foam, from rock to rock, and at length leaping in one vaſt column into a deep gulf; where it hurried along, bearing a copious contribution to the main river. A little further on, the road turned off, and brought us to the ſide of Llyn-y-dinas, a conſiderable lake walled in by huge mountains, whoſe baſes were dimly ſeen through the rain and miſt, while numerous torrents were ruſhing down on either ſide, and momentary guſts, eddying round the rocks, daſhed againſt them billowy wreaths of cloud, or marked with foam their impetuous courſe acroſs the lake. Sloping down to the water, were a few

few incloſures of land rather better than the reſt, the produce of which, conſiſting of moſſes, orchiſes, and aſphodels, with a ſmall proportion of graſs, was mown to ſerve for the winter proviſion of the cattle and ſheep. This miſerable crop of hay, however, the unuſually heavy rains had almoſt deſtroyed, and the violent wind would have carried it into the lake, had not the ſingular precaution been taken of making the cocks ſcarcely larger than crows-neſts, with a great ſtone placed upon each, ſerving to keep it ſteady, as well as in ſome degree defending it from the rain. To Llyn-y-ddinas ſucceeded Llyn-gwinedd, of rather larger dimenſions than the former, with ſeveral conſiderable woods on its ſhores; among which might plainly be diſcovered the white ſpray of numerous waterfalls, formed by the ſwollen rivulets that deſcended through them into the lake. Here the road croſſes the valley, but as it would have been madneſs to attempt fording the river that conveys the accumulated waters of the upper into the

lower lake, we ſtill kept on the left ſide of the vale, following a narrow rugged foot-path, that at length brought us to the upper extremity of Llyn-gwinedd: hence with ſome difficulty we forced our way through a ſteep ſwampy wood on our right, and recovered the road. This road from the beginning of its aſcent out of the valley, for above a mile, is a continued ſeries of rude broken ſteps, very narrow and winding, aſcending the ſteep face of a craggy mountain that overlooks the lake, without any parapet wall, or the ſlighteſt barrier, in places where the deſcent is all but perpendicular. A more dangerous *horſe road* (for theſe mountainous ſtairs are actually aſcended and deſcended by the Welſh horſes) I imagine no country can exhibit: it poured with rain as we went up, and the whole of this formidable paſs was one continued caſcade from top to bottom. Having at length ſurmounted the difficulty of the aſcent, we turned our backs on the grand ſcenery that had ſo amply compenſated for the unpleaſant weather,

weather, and proceeded to croſs a tract of boggy mountains as bare and deſolate as can well be imagined. The clouds in which we were involved, concealed entirely the majeſtic forms of the Snowdon mountains, which otherwiſe would have rendered this dreary country highly intereſting; whereas now, as far as the eye could reach on every ſide, it was tired by the unvarying repetition of flat, naked, barrenneſs: the only object that occupied the attention was the road; which, ſometimes perplexed by a number of diverging paths, at other times ſo full of water as to be confounded with the courſes of the ſtreams, occaſionally cauſed us no ſmall perplexity. At length we joyfully deſcried the ruins of *Caſtell-Dolwyddelan*, a fortreſs ſituated ſo as to command the paſſage off the mountains into the vale. Hence a quick deſcent conducted us to the ſmall village of *Dolwyddelan*, where, with ſome difficulty, owing to our almoſt total ignorance of the Welſh language, we procured refreſhment, which, however coarſe and homely,

homely, was very far from being unacceptable. As we were rather impatient to reach Llanrwſt, we here altered our route, and inſtead of proceeding to *Yſpytty-Evan*, took the direct road to Llanrwſt. For a little way the road runs along the rocky banks of the Ledan, one of the tributaries of the Conway; then, after aſcending a narrow paſs between two mountains, deſcends into a beautiful romantic dell, through which flows the Lugwy, a ſtream of conſiderable ſize, riſing out of *Ffynnon-Llygwy*, one of the numerous lakes that occupy the interior of Caernarvonſhire. At Pont-y-pair, a very good bridge conducted us over a noble cataract formed by the Lugwy juſt before it falls into the Conway, and introduced us into the luxuriant vale of Llanrwſt, down which we proceeded along ſhady lanes and rich meadows, through which flows the fineſt river in North Wales, with a ſwift but tranquil current. A number of neat farmhouſes and gentlemen's ſeats give an air of plenty and civilization to this valley, which

which is heightened by the desolate appearance of the bare mountains on each side. Here too we found no difficulty in inquiring our road, for we have invariably found the English language understood in the fertile and populous parts. About a mile short of Llanrwst, we passed under the beautiful woods of Gwydir, and soon after arrived at the end of our day's journey.

Since our arrival here, we have been much delighted with very excellent performance on the harp, by one of the musicians who attends the inns and public places. This appears to be an instrument capable of great variety of expression, and harmonious melody: the Welsh airs are in general lively and full of turns, which give an agreeable variety; they also succeed well in the pathetic, witness the fine strains in that favourite national tune called *Morfa-Rhudlan*, composed to record a celebrated defeat sustained by the Welsh in Rhudlan marsh. The greater number of the harpers are blind.

Llanrwst, a place of moderate size, is

beautifully ſituated on the eaſtern bank of the Conway, juſt within the Denbighſhire border: the high road from Shropſhire to Holyhead paſſes through it, which circumſtance, added to its cattle fairs, and its being the only market town in this part of the country, renders it the centre of all the buſineſs of the populous vale in the middle of which it ſtands. It is connected with the county of Caernarvon by a ſimple and elegant bridge of three arches, built in 1630, by Ynir or Inigo Jones, who was patronized by the then powerful family of the Wynnes of Gwydir.

We devoted a whole morning to a delightful ſtroll in the woods of Gwydir, ſituated oppoſite to Llanrwſt. The ancient manſion, built about two centuries ago, is an extenſive pile of building, without much regularity, but ſhows the ſplendour of the former poſſeſſors. Immediately beyond the houſe, the ground riſes very rapidly to the foot of the perpendicular cliffs that form the weſtern boundary of the valley, all which ſpace is now occupied by a fine wood,

wood, conſiſting of firs, oaks, ſycamores, beeches, and aſhes, in the higheſt luxuriance of growth that can be imagined, while the ſummit of the rocks, and every crevice or ſtep in their ſteep ſides, is adorned by the ſpiry ſpruce fir, the light, airy, pendent birch, agreeably mingled with the bright foliage and ſcarlet berries of the mountain-aſh. About half way up the rocks is an irregular plain of four or five acres, containing a few cottages, the remains of a magnificent terrace, and a handſome domeſtic chapel, built in the gothic ſtyle, and overſhadowed by a large *Spaniſh cheſnut* tree about 13 feet in girth. We climbed to the top of the cliffs that overlook this lovely ſcene, and were gratified with a view over the rich broad vale of Llanrwſt, watered by the windings of the Conway, covered with meadows and corn-fields, enlivened by villages, and ſeats peeping from among the ſheltering woods that clothe the higher and bleaker parts of the valley.

In the afternoon we walked to the village

lage of *Trefriew*, about a mile and a half from Llanrwſt, the higheſt place that the tide reaches, and as far as which the river is navigable for ſmall veſſels; a circumſtance of great importance to the agriculture of the Vale of Conway, as a ready paſſage is thus opened for the exportation of the produce, and an eaſy water carriage for lime and other bulky articles of the firſt neceſſity, ſuch as coals, caſt iron goods, &c.

We returned along the windings of the Conway, a wide, ſhallow, placid ſtream, of a duſky hue, like moſt of the large Welſh rivers. The meadows that we paſſed through were all alive with the hay harveſt, which was now in its height, the greater part of the graſs not being yet cut; the crops in general very heavy. Barley appeared to be ripening faſt, wheat ſeemed very healthy and yellow, but every field of oats was more or leſs injured by ſmut.

The mountains on the weſtern ſide of the vale are of coarſe ſlate, very abrupt, and

and interſected by numerous torrents; the eaſtern aſcent is much more gradual, riſing by eaſy ſlopes to the wilds of Merioneth-ſhire, and conſiſting for the moſt part of ſhale.

The only rare plants that fell under the very curſory notice that we were able to beſtow in botanical reſearches, were Rubus idæus, and Vaccinium uliginoſum, full of fruit, in the higher and moiſt parts of Gwydir woods.

CHAP.

CHAP. XI.

From Llanrwſt to Caernarvon, 24 miles.

Auguſt 10.

THE wind this day came about to the eaſt, and continued in the ſame quarter during the remainder of the time that we ſpent in Wales; and from this period we enjoyed an uninterrupted ſeries of bright dry weather; the eaſt wind being here as conſtantly the herald of ſerene ſettled ſunſhine, as the weſt is the parent of rain and ſtorms.

Having on a former day paſſed along the ſouthern ſide of Snowdon, we again turned our faces towards this mountain, intending to ſkirt its northern extremity; for this purpoſe we aſcended the weſtern boundary of Llanrwſt vale by the road to *Capel-Cerig*, paſſing once more at the foot of

of Gwydir, all whoſe beauties were heightened by the fine clear ſunſhine. At the diſtance of about two miles we came to a pretty extenſive dip between the mountains, full of mines, concerning which, from our own obſervation, and from converſing with one of the owners whom we accidentally met with, we learned the following particulars.

The works belong to ſeveral independent proprietors, of whom the principal are two brothers of the name of Floyd. The ſurrounding rocks are ſlate, bituminous ſhale, and trap or whin; the matrix of the ore, quartz and calcareous ſpar, the product lead and calamine, mixed however with iron ochre and pyrites, and a ſmall quantity of copper pyrites; the different ſubſtances are ſo blended, that in the ſame ſpecimen, and that by no means a large one, were found iron pyrites, and ochre, copper pyrites, lead, calamine, quartz, calcareous ſpar, bituminous ſhale, and trap. The pits are very numerous and ſhallow, the ore being for the moſt

part about twelve feet from the ſurface. The chief veins run from eaſt to weſt, and are croſſed by others from north to ſouth; they have ſcarcely any dip, but riſe a little as they enter the hill to the eaſt and ſouth; the ſtream of metal is for the moſt part but narrow, though ſome years ago a vein was worked of the thickneſs of 18 inches. The ſoil being a wet peat-moſs and very ſpringy, it is difficult, and requires a conſtant expence, to keep the mines tolerably free from water; this heavy drawback on the profits muſt continue to be endured ſo long as the property of the mines is lodged in the hands of ſeveral independent owners; whereas was the whole tract in the poſſeſſion of a company, it would be very practicable, by a level, ſloping towards the Conway, and paſſing through the bottom of the lower mines, to drain effectually the upper ones, which are by far the richeſt. The direction of the veins does not appear to be altered by a variation in the rock through which they run; we traced a vein from north to ſouth, through

through ſlate, bituminous ſhale, and grey-rock, without obſerving any deviation in the direction, as it paſſed from one ſpecies of rock to the other. The lead and calamine are ſent raw down the Conway; the former to Flint and Briſtol, the latter to Briſtol alone. The lead mines in general ſuffer greatly from the preſent lowneſs of price of that article, being reduced from £12 to about £7 per ton, a fall which has almoſt proved fatal to works that labour under the difficulties which theſe and others ſimilarly circumſtanced experience.

Hence we proceeded up a pretty narrow wooded valley to Capel-Cerig, meeting in our way with two or three fine waterfalls formed by the river Llugwy, one of which is particularly ſtriking: its height is not great, but there is a conſiderable body of water which falls in four foaming torrents into a deep baſon in the centre of a very rocky channel: a number of footings cut in the rock, ſhowed that this was the ſpot that we had heard of at Llanrwſt, as a favourite reſort of parties of

pleaſure. In the proſpects on this part of the road, *Moel-Shiabod*, a mountain ſo lofty as to conceal behind it the crags of Snowdon, attracted much of our admiration, both for its ſize, and the elegance of its outline. A few cottages and a chapel form the village of Capel-Cerig, where we propoſed to halt for the night in order to examine ſome quarries and remarkable rocks in the neighbourhood; we had however the misfortune to find the houſes all ſhut up, the inhabitants being gone to Llanrwſt fair; we had therefore no alternative but to proceed to Llanberris. We went for ſome miles through an open mountainous country, from which a number of labourers were gathering with difficulty a very ſcanty crop of hay, of which a great proportion was bog-moſs. A little further on the road divides; we choſe the left inſtead of the right hand tract, and in conſequence got almoſt upon the edge of Llyn-Gwinedd, on the road to Beddgelert, before we diſcovered our miſtake: having a great averſion to retracing our footſteps,

we

we aſcended a mountain on our right, and paſſing under the ſtupendous ſummit of Snowdon, deſcended into the upper end of Llanberris vale, and regained our road. The rocks on both ſides of us ſoared to a vaſt height, and on our right the mountains were in many places covered with thoſe upright columnar rocks which we had before remarked on the other ſide of Snowdon; the figure of theſe was very regularly pentagonal, with one of the ſides much ſmaller than the reſt; they were compoſed of a green whin of extreme hardneſs and very cellular, as indeed was almoſt every fragment of rock that we ſaw; the cells however were ſuperficial, not running to more than an inch in depth. After a while the valley took a turn, and preſented us with a glimpſe of Llanberris lake, from which the peak of Snowdon riſes with a very rapid aſcent. A lane between *hedge-rows* (an uncommon thing hereabouts) led us to Llanberris, a ſcattered village which affords one

hovel of an inn, where we found ourſelves much indebted to a traveller's appetite.

The whole of this day's journey was through what anciently formed the royal foreſt of Snowdon, and we obſerved yet remaining ſeveral ſtools of vaſt oaks which two or three centuries ago had been the pride of the wood: we obſerved alſo with pleaſure ſome conſiderable young plantations between Llanrwſt and Capel-Cerig.

The mountains near Capel-Cerig abound in fine ſpecimens of ſerpentine; and at the head of Llanberris vale we met with a narrow ridge of ſtone, compoſed of quartz and mica, of a foliated texture, and ſo ſoft as to be eaſily broken between the fingers.

The rarer plants that we found, were *Campanula hybrida*, near Capel-Cerig; *Trichomanes tunbridgenſe*, *Pteris criſpa*, *Polypodium oreopteris*, near Llanberris.

We gladly took leave this morning of our miſerable accommodations, with a fine warm ſummer's day before us, ſcarce a cloud

cloud to be ſeen even on Snowdon, and not a breath of wind ſtirring. We firſt went to ſee the copper mine which is ſituated on the upper lake about half a mile from the village. This mine conſiſts of ſeveral horizontal galleries driven into Snowdon: the rock is hard whin and hornblende ſchiſtus, the matrix quartz: the metal is a rich yellow ore, containing copper in union with ſulphur; the quantity procured is not very conſiderable. When blaſted from the rock, it is broken into pieces of a moderate ſize, paſſed through a ſtamping mill, which reduces it to a fine powder, and then well waſhed. The ſtamping mill conſiſts of ſix oaken beams ſhod with iron, and placed perpendicularly ſide by ſide along a large trough; theſe beams are alternately raiſed by a water-wheel, and then ſuffered to fall upon the ore in the trough, which when ſufficiently pounded is carried into a reſervoir by means of a ſtream of water. The ore being thus waſhed and ſorted, is ſent in boats down the two lakes, and afterwards, by a

ſhort land carriage, to Caernarvon, whence it is ſhipped for the founderies at Swanſea. The operations however of ſtamping and waſhing, are never able entirely to free the ore from the admixture of earthy particles, and on this account it is inferior to the Angleſea ore, which being raiſed in large maſſes, is ſcarcely ever mixed with foreign ſubſtances.

After viſiting the mine, we purſued our road towards Caernarvon along the ſide of the lake, which is a beautiful piece of water, and being quite unruffled, reflected the cliffs on its banks with ſo much vividneſs as to produce a complete optical deception. This lake formerly abounded with char and other fiſh, all of which are now deſtroyed by the waſhings from the ſtamping mill. The upper and lower lakes are ſeparated by a bold rocky promontory, on which are ſeated the ruins of Dolbadern-caſtle, at the foot of which flows the river that, riſing in the upper end of Llanberris vale, paſſes through the lakes, and falls into the Menai at Caer-

narvon. Directly oppoſite the caſtle are conſiderable quarries of a moderately fine purple ſlate, which is ſent to Caernarvon, and thence exported in large quantities. The lower lake is of a very beautiful and elegant form, of more extenſive dimenſions than the upper one, and overlooked by majeſtic mountains riſing for the moſt part abruptly from its ſhores. Nature has done ſo much for it, that it only wants the hand of art to embelliſh the borders, and plant ſome of the more gradual declivities, in order to render this ſpot as completely picturesque as any that we have yet met with. We quitted the immediate banks of this water, but continued along its courſe and in ſight of it for two or three miles further; at length we reached the ſummit of a hill, whence the road begins to deſcend towards the Menai, where a noble and extenſive view ſuddenly opened upon us. Before us, in the diſtance, was the iſle of Angleſea; to the north ſtretched the fine bay of Beaumaris, with veſſels at anchor under Puffin iſland, a projecting

projecting rock at the furtheſt point of the bay: at the ſouthern extremity of the iſland we ſaw the broad opening of the Menai from the main ſea, and the huge caſtle of Caernarvon guarding the entrance into the ſtrait. The iſland itſelf is but flat, with ſome hills however riſing in the centre and at each extremity; we alſo noticed a peculiarly ſtriking chain of mountains to the ſouth of Caernarvon, and appearing to be near Traeth Mawr: we recognized in them the ſame outlines which had forcibly ſtruck us when tracing the line of coaſt at Aberyſtwith, being in fact that elevated ridge that occupies the centre of the projecting part of Caernarvonſhire. In the courſe of our deſcent, where the rocks ended, we arrived at a plain of conſiderable dimenſions, ſo covered with large rounded fragments of rock, as to reſemble the plains where Jove is fabled to have overwhelmed the giants with a ſhower of ſtones. To a mineralogiſt, or rather geologiſt, this plain was very intereſting; the *rounded form of the ſtones*,

which were of the ſame kind as thoſe which compoſe the various rocks of Snowdon and its vicinity, naturally ſuggeſts the idea of the agency of water; eſpecially as the deſcent is towards the ſea, and the plain itſelf not more than four or five miles diſtant: the ſize alone of the ſtones, forbids the ſuppoſition of their having been carried to their preſent ſituation by man, and they are too far off from the mountains, to have rolled down into the plain where they now lie. Further, the ſoil of the plain is like other alluvial ſoil, namely, gravel, and ſand, or ſhingle. Theſe appearances continued as we approached Caernarvon, except that the maſſes of ſtone were ſmaller and leſs frequent, and the ſand and gravel more plentiful. From this an obvious concluſion is, that at the time when the ſea occupied the ſtony plain juſt mentioned, the coaſt of Caernarvonſhire, and the whole iſland of Angleſey, except one or two hills, muſt have been under water. This hypotheſis will be reduced to a certainty, as far as the nature

nature of the ſubject will admit, if it appears that ſeveral of the mineral products of the coaſt, and of Angleſey, are clearly of marine origin; and it may alſo perhaps throw light on the formation of thoſe ſubſtances whoſe origin is ſtill a ſubject of controverſy.

Early in the afternoon we entered Caernarvon, which is a handſome town, and one of the largeſt in North Wales: it is walled round, and the fortifications ſtill remain very complete: being, however, a thriving place, it has extended itſelf ſo much beyond its ancient walls, that the ſuburbs are nearly as extenſive and populous as the old town. From every part the caſtle forms a grand and ſtriking object. This building, the work of Edward the firſt, the conqueror of the principality, and the birth-place of his ſon Edward II. is by far the moſt magnificent fortreſs in North Wales. On the outſide it is, upon the whole, very entire, except that the towers are a good deal injured in the battlements. The form of the caſtle is a long

long ſquare, rather irregular, encloſing an area of about two acres and a half. On entering the gates, the injuries of time are more apparent, little elſe remaining than the outer walls, and four vaſt octagonal towers; in one of theſe, called the Eagle-tower, are the remains of a very magnificent apartment, which is ſuppoſed to have been the birth-place of Edward II; Mr. Pennant, indeed, imagines a ſmaller room, or rather a large cloſet, on the ſame floor with the other, to have been the queen's chamber. It is, however, an inquiry of very little importance, and neither ability nor inclination in the leaſt prompted us to attempt a deciſion on the point in queſtion. Theſe noble remains are entirely untenanted; but the property of them reſides in Lord Uxbridge, as warden of the caſtle.

The town of Caernarvon is ſituated partly on the Menai, which is here upwards of a mile in breadth, and partly on the ſmall river of St. Helen's. The Menai opens into the ſea a little ſouth of Caernarvon,

narvon, and forms a ſafe harbour for veſſels of five or ſix hundred tons. Its export trade is conſiderable, conſiſting for the moſt part of ſlates, which are ſent to Liverpool, Briſtol, Dublin, and London; the copper alſo, that is procured from the Llanberris mine, is here ſhipped for Swanſea; and a few pieces of flannel and Welſh webs are annually ſent from this port coaſtwiſe, or tranſmitted direct to America. We ſaw in the road an American ſhip of about 400 tons, that had landed tar, potaſh, and other articles, and was taking in a cargo of ſlates, flannels, and a fine ſort of ochre which is found in Angleſey. The county aſſizes are held here; there is therefore a jail, ſeſſions houſe, and other public buildings, annexed to the law-department. Several genteel families reſide in the neighbourhood; and the convenience of the ſea-baths, which Lord Uxbridge is about to erect, will probably induce as great a reſort of company hither, during the ſummer ſeaſon, as at Aberyſtwith, or any other town on the Welſh coaſt.

CHAP.

CHAP. XII.

From Caernarvon to Llanerchymedd, 19 miles.

August 12.

We left Caernarvon this morning, on a ſultry ſummer's day, an invaluable one for the hay harveſt, which now occupied the whole country. The four firſt miles of our road lay along the beautiful ſhores of the Menai, which is here about a mile in breadth at high water, and winds in an eaſy manner through its wooded banks like a large river. In one reſpect, however, it has greatly the advantage of any freſh water ſtream; it always retains its tranſparency, and the beautiful greeniſh hue that is peculiar to the water of the ſea; whereas moſt rivers at high tide are muddy, and though they regain their clearneſs

neſs as they ſubſide, yet they never acquire that brilliancy and varying ſplendour of tint, which is the diſtinguiſhing beauty of ſalt water. We croſſed over into Angleſey at Moel-y-don ferry, and entered the iſland under the ſhady groves of Plas-newydd, Plas-Gwynn, Plas-Llanedwen, and Plas-coch, four large manſions, of which the former is the reſidence of Lord Uxbridge. The county of Angleſey has a very different appearance from that of the oppoſite coaſt of Caernarvon. It is in general flat, with ſome hills riſing here and there, but of inconſiderable height; the land is for the moſt part encloſed, and well cropped with graſs and corn: the ſoil is but ſhallow, and lime appears to be the general manure: indeed, it may be made an univerſal obſervation with regard to North Wales, that wherever lime is to be had, the produce both of corn and graſs is very abundant.

The parts adjacent to the Menai are finely wooded, but the trees commonly ſhrink from the ſouth-weſt, and many of them

them are entirely blighted from that quarter. The interior of the iſland is more naked, but raiſes much corn, and breeds many cattle and ſheep. We obſerved that the ſheep were almoſt univerſally fettered, the fore and hind leg on each ſide being faſtened by a ſtraw band, in ſuch a manner as to allow them to walk, yet to prevent them from running or leaping over the fences; which are difficult to raiſe, and eaſily deſtroyed, in this open, expoſed country. After walking a few miles to the north-weſt, we turned round to enjoy a ſplendid view of the grand chain of the Caernarvonſhire mountains which we had juſt quitted. They extend all acroſs the county from Penmaen-mawr, to Traeth-mawr, in one continued chain, whoſe outline is varied at irregular intervals by conical peaks towering above the reſt; theſe gradually riſe to the ſummit of Snowdon, and again as gradually decline, till they terminate altogether in the northern horn of Cardigan bay. As we recede from this noble chain of mountains, the con-

necting branches are loſt, and only the inſulated peaks appear in the horizon. Angleſey is ſo much a thoroughfare from Ireland, and has ſo much buſineſs of its own, that the roads are in general very good, and (what is unuſual in Wales) the traveller often meets with direction poſts in the diviſions of the road. The face of the iſland is but little intereſting to the traveller, though it affords a rich harveſt to the mineralogiſt. We paſſed through the villages of Ceint and Llangefni, and arrived in the evening at Llanerchymedd, a conſiderable market town, ſupported chiefly by its neighbourhood to the vaſt works of the Parys mountain.

The higheſt and interior ridges of the Snowdon mountains, it has been already remarked, are compoſed of granite, whin, porphyry, and other primitive aggregate rocks; on each ſide of theſe are applied the mountainous banks of ſlate, of which the coarſeſt are on the eaſtern ſide, and the fineſt invariably on the weſtern ſide of the central ridges: theſe ſlates, in general, growing

growing finer as they deſcend, occupy the country between Snowdon and the Menai, uſually terminating within a few hundred yards of its banks. The immediate banks and channel of the ſtrait conſiſt, I. Of limeſtone varying in colour from a full brick-red, to a pale ſalmon hue: it lies in ſtrata from a few inches to two feet thick, having an inclination of 10 or 12 degrees towards the water; in many places it is quite honey-combed, and interſected by thin perpendicular ſtrata, ſometimes double, at other times ſingle, of confuſedly cryſtallized calcareous ſpar; it contains none, or at leaſt very few, remains or impreſſions of organized bodies. II. Breccia, i. e. the fragments of the Snowdon mountains, and eſpecially quartz pebbles, in a calcareous cement. (Of this breccia Caernarvon caſtle is built, and it ſeems to be a very durable material.) Both theſe are covered in many places with a ſtratum of bituminous ſhale, about five feet thick; in others, by an alluvial bed of the ſame

thickneſs. III. Hard or indurated marl, incloſing ſhells.

From Moel-y-don ferry we paſſed two low ridges of a green, waved, laminated ſlate rock, of an aſbeſtine appearance, in ſtrata perpendicular to the horizon: but at Ceint, near which place coals are found, we arrived at a low ridge of purple or liver-coloured limeſtone in confuſed ſtrata, with marl between them, and an alluvial covering of ſix or ſeven feet of ſhale, whin, &c. in rounded fragments. A little beyond Ceint, the lime and alluvial ſoil is more intimately mixed, forming breccia; and near Llangefni, this breccia, together with purple and veined grey marble, is found in the ſtone fences. From Llangefni to Llanerchymedd, the waved aſbeſtine rock again makes its appearance.

CHAP.

CHAP. XIII.

From Llanerchymedd to Amlwch, 6 miles. Copper mine.

August 13.

THIS has been a moſt intereſting and entertaining day, being ſpent in viſiting the vaſt copper-works connected with the Parys mountain. We breakfaſted at Amlwch, a conſiderable town on the coaſt, about two miles from the mine, and almoſt entirely peopled by the miners and their families.

We had no difficulty in diſtinguiſhing this celebrated mountain, for it is perfectly barren from the ſummit to the plain below, not a ſingle ſhrub, and hardly a blade of graſs, being able to live in this ſulphureous atmoſphere.

" No graſſy mantle hides the ſable hills,
" No flowery chaplet crowns the trickling rills;
" Nor tufted moſs, nor leathery lichen creeps
" In ruſſet tapeſtry o'er the crumbling ſteeps."

DARWIN.

The nearer we approached the ſcene of buſineſs, the more penetrating was the fume of the ſulphur; but we had very ſoon too many objects of attention to regard this inconvenience. The mountain is about a mile in length, and is the property of Lord Uxbridge and the Rev. Mr. Hughes; and the fortunate diſcovery of the copper took place a little more than thirty years ago, thus converting a piece of ground originally of very little value, into one of the moſt profitable eſtates in the kingdom.

The ſubſtance of the mountain being ore, the work is carried on in a very different manner from the cuſtom of other mines: here are comparatively few ſhafts or levels, the greater part being quarried out ſo as to leave a vaſt excavation open to the day. There are two of theſe quarries

ries or mines, which are worked by two different companies; the firſt goes by the name of the Mona mine, and is the ſole property of Lord Uxbridge; the other, called the Parys mine, is ſhared between the earl and Mr. Hughes. The view down this ſteep and extenſive hollow is ſingularly ſtriking. The ſides are chiefly of a deep yellow or duſky ſlate colour, ſtreaked, however, here and there, by fine veins of blue or green, ſhooting acroſs the cavern, mingled with ſeams of greyiſh yellow. The bottom of the pit is by no means regular, but exhibits large and deep burrows in various parts, where a richer vein has been followed in preference to the reſt. Every corner of this vaſt excavation reſounds with the noiſe of pick-axes and hammers; the edges are lined with workmen drawing up the ore from below; and at ſhort intervals is heard, from different quarters, the loud exploſion of the gunpowder by which the rock is blaſted, reverberated in pealing echoes from every ſide.

The exterior covering of the mountain is an aluminous ſlate; the matrix black-grey chertz; the ore, *Copper*, chiefly

I. *The yellow ſulphurated:* of which the richeſt contains, according to miners computation, that is in the proportions of the oz. Troy,

Sulphur, 5 dwt. (25 per cent.)
Copper, Ditto.
Refuſe, 10 dwt. (50 per cent.)

The worſt ore yields nearly the ſame quantity of ſulphur; but of metal, no more than 6 grains ($1\frac{1}{4}$ per cent.); this inferior kind, however, is chiefly worked for the ſulphur. The other ſpecies and varieties of ore that the mine produces, are,

II. *Black ore*, containing copper mixed with galena, calamine, and a little ſilver.

III. *Malachite*, or green and blue carbonate of copper.

IV. *Native Copper*, but in very ſmall quantity.

V. *Sulphate of Copper*, cryſtallized, and in ſolution.

VI. *Sulphate*

VI. *Sulphate of Lead*, in conſiderable quantity, containing a pretty large proportion of ſilver.

VII. *Native Sulphur.*

Proceſs.—The ore is got from the mine by blaſting; after which it is broken into ſmaller pieces by the hammer (this being chiefly done by women and children), and piled into a *kiln*, to which is attached by flues a long ſulphur chamber. It is now covered cloſe; a little fire is applied in different places; and the whole maſs becomes gradually kindled: the ſulphur ſublimes to the top of the kiln, whence the flues convey it to the chamber appointed for its reception. This ſmouldering heat is kept up for ſix months, during which the ſulphur chamber is cleared four times, at the expiration of which period the ore is ſufficiently roaſted. The pooreſt of this, that is, ſuch as contains from $1\frac{1}{4}$ to 2 per cent. of metal, is then conveyed to the ſmelting houſes at Amlwch-port; the reſt is ſent to the company's furnaces at Swanſea,

ſea, and Stanley near Liverpool. The greater part of the kilns are very long, about ſix feet high, and the ſulphur chambers are of the ſame length and height, connected by three flues, and on the *ſame level* with the kilns: ſome new ones however have been built at Amlwch-port, by which much ſulphur is preſerved that would have been diſſipated in the old kilns. The new ones are made like lime kilns, with a contrivance to take out at the bottom the roaſted ore, and thus keep up a perpetual fire: from the neck of the kiln branches off a ſingle flue, which conveys the ſulphur into a receiving chamber built on the rock, ſo as to be on a level with the neck of the kiln, i. e. *above* the ore.

The two ſmelting houſes, of which one belongs to each company, contain thirty-one reverberatory furnaces, the chimneys of which are 41 feet high; they are charged every five hours with 12 cwt. of ore, which yields $\frac{1}{2}$ cwt. of rough copper, containing 50 per cent. of pure metal; the

price of rough copper is about £2. 10s. per cwt. The coals are procured from Swanſea and Liverpool, a great part of which is *Wigan ſlack*. From experiment it appears, that though a ton of coals will reduce more ore than the ſame quantity of ſlack, yet, owing to the difference of price, the latter is upon the whole preferable; the prices of the two at Liverpool being, coals 8s. 6d. per ton, ſlack 5s. per ditto.

The ſulphate of copper however is the richeſt ore that the mine yields, containing about 50 per cent. of pure metal. This is found in ſolution at the bottom of the mine, whence it is pumped up into ciſterns like tanners pits, about two feet deep; of theſe pits there are many ranges, each range communicating with a ſhallow pool of conſiderable extent; into theſe ciſterns are put caſt iron plates, and other damaged iron veſſels procured from Coalbrook dale; when the ſulphuric acid enters into combination with the iron, letting fall the copper in the form of a red ſediment very ſlightly oxidated. The ciſterns

terns are cleared once in a quarter of a year, when the ſulphate of iron in ſolution is let off into the ſhallow pool, and the copper is taken to a kiln, well dried, and is then ready for exportation. The ſulphate of iron remaining in the pool partly decompoſes by ſpontaneous evaporation, and lets fall a yellow ochre which is dried and ſent to Liverpool and London.

The ſulphur produced in the roaſting, after being melted and refined, is caſt into rolls and large cones, and ſent to London. The cones are uſed chiefly for the manufactory of gunpowder and ſulphuric acid.

Green vitriol, and alum, are alſo made in ſmall quantities by a ſeparate company, but to theſe works ſtrangers are not admitted.

The number of men employed by the two companies is 1200 miners, and about 90 ſmelters: the miners are paid by the piece, and earn in general from a ſhilling to twenty-pence per day.

The depth of the mine in the loweſt part

part is 50 fathoms, and the ore continues as plentiful as ever, and of a quality rather ſuperior to that which lay nearer the ſurface.

With regard to the annual quantity of ore raiſed, little certain can be mentioned. The Parys mine has furniſhed from 5000 to 10,000 tons per quarter, excluſive of what is procured from the ſulphate of copper in ſolution; and as the two mines employ nearly equal numbers of workmen, they probably afford about the ſame quantity of ore.

Adjoining to the ſmelting houſes is a rolling mill, upon the ſame conſtruction as malt-mills, for grinding the materials for fire bricks: theſe conſiſt of fragments of old fire bricks, with *clunch*, (a kind of magneſian clay found in coal-pits) procured from near Bangor ferry.

The port of Amlwch is chiefly artificial, being cut out of the rock with much labour and expence, and is capable of containing 30 veſſels of 200 tons burthen: it is greatly expoſed, and dangerous of acceſs

ceſs during high northerly winds, which drive a heavy ſea up the neck of the harbour. The two companies employ 15 brigs, from 100 to 150 tons burthen, beſides ſloops and other craft, all of which lie dry at low water.

The various articles, the produce of the mines, which are exported, are the following:

I. Coarſe regulus of copper, from the ſmelting houſes.

II. The richer copper ore, roaſted.

III. The dried precipitate of copper, from the vitriol pits.

IV. Refined ſulphur.

V. Ochre.

VI. Alum.

VII. Green vitriol.

The town of Amlwch, which about 30 years ago had no more than half a dozen houſes in the whole pariſh, now ſupports a population of four or five thouſand inhabitants; and was at preſent, being market day, thronged with miners, and country people. After dinner we walked along the

the ſea-ſhore, climbing the ſteep ſlate rocks, whence the water below appeared of a beautiful green, and ſo tranſparent as to ſhow the ſhelving rocks to a great depth beneath.

Having heard that at Camlyn bay, about eight miles weſt of Amlwch, there were ſome marble quarries, and that it furniſhed aſbeſtos, we reſolved to ſpend this day in viſiting it: the road lay in general about half a mile from the coaſt, the ſubſtratum was waved green magneſian ſlate. When we arrived at Camlyn bay, we looked in vain for marble or aſbeſtos, and proceeded homewards along the coaſt. The ſhore of Camlyn bay conſiſts entirely of green and purple waved magneſian ſlate-rock, with large veins of quartz. Having arrived at a promontory that ſeparates Cemmaes bay from the former, we found it to conſiſt of a fine blue-veined limeſtone, or common marble; ſome way on, near the village of Cemmaes, this limeſtone is cut through by a ſtratum deſcending to

the

the water, about 40 yards wide, of black ſhale containing iron pyrites, and in the caverns dug in this, probably in a fruitleſs ſearch after metals, are effloreſcences of ſulphate of iron, and chalybeat ſprings. To this ſucceeds a beautiful water-grey ſand mixed with lime, but of little coherence, on expoſure to the air taking an ochery ſtain. Adjoining to this are a few yards of calcareous freeſtone, and then a cliff of very hard white and water-grey marble; a range of ſand and looſe freeſtone ſucceeds, and the bay terminates with a marble promontory. The ſoil of the land ſurrounding the bay is for the moſt part, eſpecially near the village, a deep ſand. The limeſtone terminates ſhortly after, and the green waved magneſian ſlate continues the boundary of the iſland. This ridge of lime is in general higher than the ſlate, deſcribing an irregularly indented line of coaſt, about four miles long: its breadth varies from a quarter to half a mile, and a narrow valley, forming its

its outline towards the land, ſeparates it entirely from the aſbeſtine ſlate, thus preventing any intermediate ſtrata.

The whole of this coaſt is cut out into bays or receſſes of various forms and dimenſions, with lofty projecting promontories, which are for the moſt part fine ſheep walks. A number of iſlands alſo are formed by ledges of rock, many of them a good way out at ſea, and at high water juſt appearing like black ſpots in the midſt of the waves: many of theſe creeks are ſecure havens for ſmall veſſels, which are protected from weſt and ſouth-weſt winds by the rocks. The village of Cemmaes ſtands upon a little creek opening into a moſt beautiful bay about a mile acroſs: its entrance into the main ſea is guarded on each ſide by a craggy promontory, the one of grey, the other of ſnow-white marble, gliſtering above the green ſea, ſmooth as the ſurface of a mirror, and whoſe ſparkling tranſparency baffles deſcription. In the interior receſs of the bay, the bank of black ſhale mentioned

above, was finely contraſted with a lofty irregular projecting arch of white marble, pierced by the conſtant daſhing of the waves; while the ſounds of laughter and merriment proceeding from two boats crews of young people that had juſt puſhed out of the creek on a party of pleaſure, added double life and intereſt to this lovely ſcene. The land adjoining the cliffs that overlook the ſea produces a good deal of corn, chiefly oats and barley. A golden tinge already begins to appear, that will uſher in the harveſt, as ſoon as the crop of hay, with which the farmers are now buſied, is ſafely houſed.

As we approached Amlwch, we were much pleaſed with ſeeing the ſcars of rock between the town and ſea, occupied by numerous groupes of men, women, and children, all neat and in their beſt clothes, it being Sunday, who were enjoying the mild temperature of a ſummer evening, rendered refreſhing by the neighbourhood of the ſea. In one place we obſerved a circle of men gathered round a point of rock,

rock, on which was ſeated the orator of the party reading a newſpaper aloud, and commenting upon it: on other little eminences were ſeen family parties, the elder ones converſing, and the younger children gamboling about them, or running races with each other: in a new mown meadow cloſe to the town we paſſed by a large company of lads and laſſes ſeated on a green bank, chatting, laughing, and full of mirth and frolick. To one who had been a ſpectator of the groſs and riotous delight too frequent on holiday evenings in the outſkirts of the metropolis, or any large town in England, the contraſt could not fail of being very ſtriking, and much to the advantage of the inhabitants of Amlwch: out of the whole number we did not ſee one drinking party; the pleaſures of ſociety and mutual converſe needed not the aid of intoxication to heighten their reliſh.

Meantime the ſong went round, and dance and ſport,
Wiſdom and friendly talk, ſucceſſive, ſtole

Their hours away: while in the roſy vale
Love breath'd his infant ſighs, from anguiſh free,
And full repſete with bliſs; ſave the ſweet pain
That inly thrilling but exalts it more.

Harmonious nature too look'd ſmiling on,
Clear ſhone the ſkies, cool'd with eternal gales,
And balmy ſpirit all. THOMSON.

I am acquainted with no place the manners of whoſe inhabitants are ſo unexceptionable (as far at leaſt as a ſtranger is enabled to judge of them) as Amlwch; and the favourable opinion which I was led to entertain of them on viſiting the town laſt year, is confirmed by what I have obſerved at preſent. Not a ſingle inſtance have I known of drunkenneſs, not one quarrel have I witneſſed during two very crowded market-days, and one of them a day of unuſual indulgence, that I paſſed at this place; and I believe no gaol, or bridewell, or houſe of confinement, exiſts in the town or neighbourhood. Moſt of the miners are *methodiſts*, and to the prevalence of this religious ſect is chiefly

chiefly to be attributed the good order that is ſo conſpicuous. Men who have been long confirmed in habits of vice and irregularity, need arguments the moſt potent that can be offered, to counterbalance the aſſociated power of habit and inclination: were it poſſible forcibly to tear them from their connexions, and to place them in an entirely different ſituation, reaſon might then be called in gradually to perfect the cure; but where this cannot be done, (and in moſt caſes it is impracticable) what argument can be urged of ſuch overbearing force as to combat with and overthrow the moſt rooted propenſities, even upon their own territory, unaſſiſted by external coercion, except a ſtrong and impreſſive appeal to their hopes and fears; and, by preſenting both exaggerated and in full contraſt, to overwhelm the mind by ſurpriſe and alarm?

After ſupper we ſtrolled up to the mountain, which now no longer reſounded with the confuſed noiſe of pick-axes and hammers; all was huſhed in profound ſi-

lence; and the moon-beams which were reflected bright from the ſides of the vaſt excavations, could ſcarcely penetrate the deep abyſs below. As we returned we were ſtruck with the clear red vivid flames, iſſuing in a large body from the long range of ſmelting houſes on the coaſt, and caſting their rays to a great diſtance.

CHAP.

CHAP. XIV.

From Amlwch to Bangor, 24 miles.

August 15.

We left Amlwch this morning, and retraced part of our former road as far as Llanerchymedd. In our way we met a long train of hay waggons, not ſmall ſledges, as in Merioneth, but well piled wains, bringing home the fruits of a plentiful harveſt. From Llanerchymedd we proceeded eaſtward, tending a little to the ſouth, till we came in view of the ſea at *Red-wharf-bay:* hence we arrived by the direct road, at Bangor-ferry. As we approached the Menai, the Caernarvonſhire mountains again opened upon us with great dignity: at firſt only the inſulated ſummits appeared, irregularly ſcattered along the line of the horizon; then the higheſt or

the connecting ridges roſe upon the view, and at length the whole aſcent from the ſhores of the Menai to the peak of Snowdon preſented itſelf, forming the grandeſt boundary of the extenſive proſpect that can be conceived, the atmoſphere being ſo clear that the whole length of the Welſh alps might with eaſe be diſtinctly obſerved. On a heath which we croſſed, we ſaw for the firſt time, a ſmall flock of goats browzing on the extremities of the gorſe buſhes, among which the venerable father of the flock was well diſtinguiſhed by his white flaky mantle, his flowing beard, and the long curvature of his horns. Goats uſed formerly to abound in Wales, but are now almoſt entirely ſuperſeded by ſheep, which laſt have increaſed to their preſent numbers, in proportion to the encouragement given to the manufactory of woollen goods. Near the ferry we met a team of twelve or fourteen fine oxen dragging a large maſt from the water's edge. Their broad thick ſhoulders and neck, and ſtrong ſhort legs, adapt them admirably

ably for beaſts of burden, but their ſlowneſs and awkwardneſs entirely unfit them for any work where the leaſt ſkill in driving is required; we ſaw theſe attempting to turn out of the high road through a gate, and when, after being ten times longer in turning than horſes would have been, they attempted to draw the loaded wain through the gate, ſome ſtood ſtill, others pulled in different directions, ſo as to drive the maſt againſt a ſtone buttreſs on which the gate was hung, with ſuch force as to ſhatter and almoſt overthrow it. We did not ſtay to ſee how they would extricate themſelves from their difficulty, but proceeded to the ferry. It fortunately happened that ſeveral herds of black cattle that had been reared in Angleſey were then croſſing the ſtrait, on their road to Abergeley fair, where they are bought up by drovers, and diſpoſed of at Barnet fair to the farmers in the neighbourhood, who fatten them for the London market. We were much amuſed with ſeeing a large herd driven over. They

They are urged in a body by loud ſhoutings and blows into the water, and as they ſwim well and faſt, uſually make their way for the oppoſite ſhore: the whole troop proceeds pretty regularly till it arrives within about an hundred and fifty yards of the landing place, when, meeting with a very rapid current formed by the tide, eddying, and ruſhing with great violence between the rocks that encroach far into the channel, the herd is thrown into the utmoſt confuſion. Some of the boldeſt and ſtrongeſt puſh directly acroſs, and preſently reach the land; the more timorous immediately turn round, and endeavour to gain the place from which they ſet off; but the greater part, borne down by the force of the ſtream, are carried towards Beaumaris bay, and frequently float to a great diſtance before they are able to reach the Caernarvonſhire ſhore. To prevent accidents a number of boats well manned attend, who row after the ſtragglers to force them to join the main body; and if they are very obſtinate, the boatmen throw

throw ropes about their horns, and fairly tow them to the ſhore, which reſounds with the loud bellowing of thoſe that are landed, and are ſhaking their wet ſides. Notwithſtanding the great number of cattle that annually paſs the ſtrait, an inſtance ſeldom, if ever, occurs, of any being loſt, though they are frequently carried to the very entrance of the Menai in Beaumaris bay. We here croſſed the ferry, and ſoon after arrived at the neat, genteel, and beautiful little city of Bangor.

To Llanerchymedd from Amlwch we paſſed ſeveral ridges of the green aſbeſtine ſlate before mentioned. A little beyond, the road runs along a ridge of aggregate rock containing quartz, iron, foliated magneſia, and clay. To this ſucceed breccias, and lime in a clay cement; then ſeveral ranges ſtretching to the coaſt, of limeſtone and breccia. In all theſe breccias and moſt of the others that we have met with in Angleſey, the pebbles incloſed in the calcareous cement are of quartz alone, a circumſtance ſeemingly not eaſy to

to be accounted for, ſince quartz is far from being the moſt common ſtone in theſe or the neighbouring parts. The whole of this county bears moſt evident marks of having at ſome former period been under water; there are numerous entirely detached large rounded fragments ſcattered on every ſide, and the rocks themſelves afford ample proofs of the action of water on their ſurfaces: in one place we obſerved a large bank of almoſt bare ſhingle, running towards Red-wharf between two low ridges of lime. The upper ſtratum of this rocky ſoil is very commonly full of ſhells and other marine exuviæ: it is very hard, of a ſmoke colour, and burns to a moſt excellent white quicklime, which falls to a ſoft pulp with great heat on the affuſion of water. We again diſcovered the green aſbeſtine rock terminating Angleſey at Bangor ferry: the oppoſite Caernarvonſhire coaſt is limeſtone, reſting on ſlate: near Bangor the lime diſappears, and the ſlate alone ſtretches into Beaumaris bay.

Bangor

Bangor is ſituated in a narrow valley between two low ridges of ſlate rock, opening ſouthwards towards Snowdon, and terminating northwards about half a mile from the cathedral, in the beautiful bay of Beaumaris; and a more charming ſituation can ſcarcely be found. This fine bay is formed on one ſide by the Angleſey coaſt riſing into ſmall hills, and well wooded to the water's edge; further on, the ſhore is occupied by the town of Beaumaris, the low towers of whoſe caſtle are diſtinctly viſible from the beach at Bangor. The entrance of the bay is guarded by Puffin iſland or Prieſt holm, to the weſt, and on the eaſt by the vaſt promontory of Ormes head; proceeding hence towards Bangor, the mouth and harbour of Conway firſt preſents itſelf; then the rock of Penmaen-bach forming an abrupt ſhore which continues as far as the ſoaring cliffs of Penmaen-mawr, covered with clouds, and overhanging the ſea with its looſe crags. Hence to Bangor the mountains recede, ſloping gently to the water, their lower

lower parts peopled by almoſt a continued line of villages, and overſpread with heavy crops of wheat and barley.

Half a mile from Bangor, on the ſhore of the bay, is Abercrugin, or Port-Penrhyn, the grand depoſitary of the ſlates that are procured from Lord Penrhyn's quarries at Dôlawen. Along the quay of this ſmall port very large brigs and ſnows can lie with ſufficient depth of water; we ſaw ten or a dozen veſſels of 150 to 250 tons, taking in their loading, which conſiſts of extremely fine ſlates of a large ſize, and ſlabs of ſlate rock, I ſuppoſe for grave-ſtones. Several of the veſſels were from Dublin, and other Iriſh ports; the reſt belonged to London, Liverpool, and Briſtol. While we were at the quay the evening began to cloſe. The tide was nearly at its height, all the ſands were covered with water; the glow from the ſetting ſun had ceaſed to illuminate the mountainous boundary of the bay, and a ſoft dubious twilight was creeping over the ſea, blending every different ſhade of reflection from the

the cliffs of Ormes-head, into one broad uniform maſs of ſhadow: the town of Beaumaris was ſcarcely diſtinguiſhable, except by the lights here and there ſtreaming from the windows of the houſes neareſt the water. The ſtill repoſe of the ſcene was at length interrupted by the crew of a large brig, lying in the Menai about midway between the port and Beaumaris, heaving anchor: preſently after we ſaw the ſails ſet, and the veſſel warping ſlowly towards the pier on which we were ſtanding: before ſhe had got into moorings, the moon, almoſt full, roſe with ſurpriſing majeſty over the crags of Snowdon, ſilvering firſt the higheſt peaks, and ſoon after enlightening the whole maſs of mountains, while the openings of the vallies between them were diſtinguiſhed by a dark ſhade in full contraſt to the brightneſs of the other part. We reluctantly quitted this delightful ſcene, and returned to our inn at Bangor, where we were very well accommodated.

CHAP.

CHAP. XV.

From Bangor to St. Aſaph.

August 16.

We left Bangor this morning, and paid a ſecond viſit to Port-penrhyn, after which we proceeded on our road to Conway: almoſt cloſe to the port is a ſmall white houſe, inhabited by Lord Penrhyn's agent, built by Wyatt in a moſt happy ſtyle of architecture, and ſheltered by a flouriſhing plantation diſpoſed with great taſte. A little further on, riſe the towers of Lord Penrhyn's noble manſion, an ancient ſtructure, but beautified and enlarged by the celebrated architect juſt mentioned. The entrance into the park is through an elegant and highly finiſhed gateway reſembling a triumphal arch. This ſeat commands a beautiful view of Beaumaris bay,

and, on the coaſt of Angleſey, of the fine woods of Baron hill, the ſeat of lord Bulkeley, which almoſt hide the houſe from the view. Continuing our journey along the coaſt through a highly cultivated country, we at length arrived at the village of Aber, from which place moſt perſons croſs the ſands on their way to Beaumaris; here we ſaw the harveſt already commenced, ſeveral fields of barley being partly cut. Soon after we arrived at Penmaen-mawr, the laſt of the long chain of the Caernarvon mountains, and though not of the firſt magnitude, yet worthy to be the extremity of that ridge of which Snowdon is the centre. The road, which is now good and ſecure, runs along the ſide of the rock about 200 feet over the ſea, which at high water daſhes againſt the foot of the mountain almoſt directly below. We climbed to the top in hopes of a fine proſpect, but though the weather was very fair, a light thin cloud had preoccupied the ſummit, and prevented us from diſtinguiſhing any diſ-

tant object. The ſummit is a rude maſs of ſhattered rock covered with heath, difficult of aſcent, and the fatigue of deſcent was far greater than we had at any time before experienced. At laſt however we reached the bottom, and quitting the ſhore by a narrow and difficult paſs between Penmaen-mawr and Penmaen-bach, ſoon arrived at Conway. Near this town the rocks of ſlate again made their appearance, extending longitudinally and parallel to Penmaen-mawr and the reſt of the Snowdon chain, which here conſiſts of very fine pale whin, with great quantities of quartz intermixed.

Conway is a ſmall and poor town, ſtrongly fortified in the ancient ſtyle, and its towers and walls are ſtill in good preſervation, though ſufficiently dilapidated to be intereſting to the antiquary and pictureſque obſerver. But the glory of this place is its noble caſtle, the work of Edward I. which is built on a low ſlate rock projecting into the river and commanding every part of the town. The Conway is here

here nearly a mile over at high water, and in the middle of the channel, oppoſite the caſtle, is a ſmall rocky iſland covered with thick underwood. A little higher up it makes a fine bend round a large projecting point ſhaded by a venerable wood, and from this ſpot the caſtle is ſeen to the greateſt advantage. We went over every corner of this large maſs of building, which is entirely ruinous in the inner part, but ſtill diſplays in the ornamented windows and arches of the great hall, ſome ſmall remains of its former magnificence. One of the principal towers, overlooking a creek formed by the mouth of a brook which here enters the river, was a few years ago ſo much undermined by the imprudence of the inhabitants in procuring ſlate from the rock on which the caſtle is built, that all the lower part from the foundations gave way in the night, and rolled to the bottom of the cliff, leaving a large breach which diſplays the interior ſtructure of the tower, and the enormous thickneſs of its maſſy walls. While we

yet lingered among theſe hoary ruins, the moon, almoſt full, began to overtop the trees on the riſing ground beyond the creek juſt now mentioned, and poured her ſoft light through the ivied windows of the great hall; the moſt perfect ſtillneſs prevailed, uninterrupted even by the leaſt breath of wind, and the mild temperature of the evening threatened no chilling interruption to the playfulneſs of fancy, or the elevated ſuggeſtions of philoſophic contemplation.

The trade of Conway is but inconſiderable; it exports a few coarſe ſlates, ſome copper from the Llandidno mines, and lead and calamine from ſeveral mines on the Caernarvon ſide of the river between Conway and Llanrwſt. The extraordinary beauty however of its ſituation attracts many viſitors; and the number of ſtrangers who paſs through in their way to or from Holyhead ſupport three or four tolerably good inns.

We quitted Conway this morning, and croſſed the river, taking boat juſt under the

the caſtle, which appears to great advantage from the middle of this noble ſtream. Having landed, we proceeded along the ſhore to the promontory of Ormes-head, or Llandidno, which forms the eaſtern boundary of the entrance into Beaumaris bay. This vaſt unconnected rock has no doubt been formerly an iſland, being at preſent joined to the main land only by a neck of low marſhes. It conſiſts entirely of limeſtone very pure and hard, but no uſe is at preſent made of this inexhauſtible treaſure, notwithſtanding its vicinity to the harbour of Conway, and the eaſe with which ſmall veſſels may be loaded from the rock itſelf. Some copper, though in no great quantity, is procured from two mines near the top of the mountain, belonging the one to a Liverpool company, the other to Sir Thomas Moſtyn. The ore is malachite or green carbonate of copper, found between the limeſtone in ſtrata about two inches thick: the works run only to the depth of 50 yards, and but few men are employed. Towards the ſea

the cliffs are very abrupt, and hollowed into various inacceſſible caverns by the daſhing of the water: in this ſecure retreat multitudes of gulls, corvorants, ravens, and rock pigeons, have taken up their abode; and ſome of the ſteepeſt crags are inhabited by the *peregrine falcon*, a ſpecies formerly much in requeſt when falconry was a faſhionable amuſement, as its ſtrength and almoſt incredible rapidity of flight admirably qualified it for the chace of the largeſt and ſwifteſt game. Mr. Pennant mentions an inſtance of one that eloped from its maſter in the county of Angus on the 24th of September 1772, and was ſhot in the morning of the 26th at Moſtyn in Flintſhire. One reaſon why theſe birds breed in Llandidno rocks, is probably the vicinity of Puffin-iſland, ſo called from the great numbers of puffins that annually breed upon it. The migration of the old ones takes place when many of the young puffins are not yet able to fly; they are therefore of neceſſity left behind in their burrows, and fall a prey to the peregrine falcons,

falcons, who watch at the entrance of their holes, till the young birds, preſſed by hunger, are obliged to come out and be devoured.

The rays of the ſun reflected from the white cliffs rendered the ſteep aſcent extremely fatiguing, and brought on an exceſſive thirſt, which the heat of the two or three paſt days prevented us from ſatisfying, all the wells, of which there are ſeveral ſhallow ones in the rock, being dried up: a ſerious inconvenience to us, but much more ſo to the inhabitants of the little village of Llandidno, who had no drinkable water within two or three miles, except what proceeded from the brackiſh ſprings of the marſh below. From Ormes head we continued our route along the ſea ſhore to little Ormes head; here we croſſed a range of fine limeſtone, the greater part of which was cryſtallized, and again deſcended to the coaſt at the mouth of the little ſtream which ſeparates Caernarvon from Denbighſhire. The tide being retiring, we proceeded along the ſands for

ſix or ſeven miles to Abergeley. The limeſtone cliffs follow the courſe of the ſhore, but as they proceed become mixed more and more with red clay. From the rocks near Llandulas much lime is procured, and laid in large heaps on the beach at low water, whence as the tide comes in, it is put on board ſmall ſloops: ſome of theſe, being left on the ſhore, were loaded from carts as they lay on the beach; an injudicious practice, which muſt frequently ſtrain the veſſels. The ſhore abounds with ſhell-fiſh and marine inſects, which furniſh a never-failing ſupply to the multitudes of ſea-fowl that inhabit the cliffs along the coaſt, and, whether flying, or ſwimming, or running along the beach, contribute greatly to enliven the proſpect. In a limeſtone rock near Abergeley are ſome deſerted lead mines. The town of Abergeley is a place of conſiderable reſort on account of its large cattle fairs, where the Angleſey oxen are for the moſt part diſpoſed of to the Engliſh graziers: it is alſo much frequented in the bathing ſea-

ſon,

ſon, though people of faſhion in general prefer Park-gate. As the fair was to commence the next day, and the number of bathers was unuſually great, being rather uncertain of accommodations, we ſet out after tea for St. Aſaph, eight miles further. A bright moonlight rendered this walk extremely pleaſant, but we reached the end of our march too late in the evening to diſtinguiſh any thing but the tall thick poplars that overhung the river Clwyd, on whoſe banks is placed the little city of St. Aſaph.

Near Ormes head we picked up ſeveral plants, of which the chief were, *Roſa ſpinoſiſſima, Salicornia herbacea, Geranium ſanguineum, Eryngium maritimum, Pulmonaria maritima, Chelidonium glaucium, Ciſtus helianthemum, Anthyllis vulneraria, Origanum majus, Arundo arenaria, Elymus arenarius.*

CHAP.

CHAP. XVI.

From St. Aſaph to Denbigh.

Auguſt 18.

ST. Aſaph is a well-built populous little town, ſituated on the river Clwyd, in the middle of the celebrated vale of the ſame name, the Eden of North Wales. This vale is an extremely rich tract of land, lying on both ſides the river, and bounded by hills of moderate height; it is near 22 miles in length, and at St. Aſaph extends to four or five in breadth. In pictureſque beauty it is not to be compared with the deep glens and romantic vallies of Merioneth and Caernarvonſhire, but it is impoſſible to exhibit a richer ſcene of high cultivation: its principal produce is corn, which rendered the landſcape at this time peculiarly intereſting and beautiful. Having

ing croſſed the northern boundary of the vale, we proceeded towards Holywell through a country moderately fertile, populous, and little intereſting. On a large common, we turned out of the high road for Downing, the ſeat of Mr. Pennant, the celebrated naturaliſt; a beautiful ſituation, covered with fine timber, and deſcending in a gentle ſlope to the banks of the Dee. From an eminence in the road we had a good view of the broad eſtuary of the Dee, marked by many a mile of bare ſand that is covered at high water. On the further ſide the Cheſhire coaſt was very plainly ſeen, and we eaſily diſtinguiſhed the long row of good houſes that forms the faſhionable watering place of Parkgate. We ſoon after arrived at Holywell, a town of conſiderable importance on account of the extenſive lead mines in the neighbourhood, and the various manufactures that are here carried on: the firſt proof of its conſequence that ſtruck us on entering the place, was a troop of cavalry who are quartered here. In the afternoon

we

we went to the famous well of St. Winifred, now as much frequented and eſteemed for the purpoſes of manufacture, as it uſed formerly to be for its miraculous healing powers. This fine ſpring is contained within a handſome ſhrine adjoining the church, and iſſues forth from a large well open to the day, over which is raiſed an elegant gothic roof. Hence it flows, a copious ſtream, into a ſtone reſervoir, formerly the conſecrated bath, and after a further courſe of about a mile, unites with the Dee. In every part of its ſhort courſe it is made ſubſervient to the purpoſes of manufacture, by turning water-mills for corn, cotton works, forges, ſmelting works and other machinery; ſo that, though its reputed value for the cure of diſeaſes is nearly loſt, its real importance is increaſed tenfold by the aſſiſtance which it gives to manufacture.

The remainder of this afternoon was ſpent in one of the principal objects of our coming hither, examining the lead mines that ſurround this town. For this purpoſe

poſe we applied to Mr. Pennant's agent, who enabled us to viſit one of the largeſt and moſt valuable. We entered it through a water-level which is cut from the bottom of the loweſt ſhaft, and is a long ſubterraneous archway that opens in a valley about 1300 yards from the bottom of the ſhaft, the top of which is on the brow of a hill. This canal is navigated by long narrow boats that are puſhed along by the hand againſt the ſides of the arch. The whole paſſage is perfectly ſtraight, and at the extremity of the level is built a mill that is turned by the waſte water from the mine. We got into the boat at the open part of the level, and ſoon loſt ſight of day-light. The firſt 600 yards of this canal are cut through ſhale and chertz, the remaining 700 through hard limeſtone; the whole paſſage was blaſted by gunpowder. When we had got nearly to the end of the level, we quitted the boat, and clambered up through the narrow winding paſſages to the ore. The veins in this mine are uncommonly rich, the

chief ſeam being from five to ſix feet thick: it is the property of fifteen owners, who employ about ſixty miners. A number of ſhafts ſunk from the top of the hill communicate with different parts of this extenſive work, the deepeſt of which (called by the workmen the *whimſey ſhaft*), goes to the depth of an hundred yards, down to the head of the water level. The great bank of ore is found about forty yards from the ſurface dipping down gradually almoſt as low as the level. The ore is chiefly galena, and ſteel ore, which laſt contains alſo ſilver: conſiderable quantities of calamine too are procured.

Aug. 19. To-day the main ſtreet of the town ſhewed a crowded and well ſupplied market, the population being ſo conſiderable as to create a large demand of proviſions from the country round. The number of inhabitants was accurately taken laſt year, and found to amount to 5396. This morning we made a moſt intereſting viſit to the copper and braſs works near the town and upon the ſtream

from the well, which ſupplies the principle of motion to the vaſt variety of mechanical force here employed. The works belong to the Angleſey companies, and are in fact the continuation of the proceſſes that we ſaw at Parys mountain.

Theſe works, which occupy a great extent of ground, are ſuperintended by Mr. Donbavand, through whoſe kindneſs we were enabled to ſee the whole proceſs to great advantage. The refined copper is received here from Swanſea and Stanley in the form of ſolid blocks, or pigs. It is firſt remelted and caſt into plates, which are cut into ſlips by ſtrong ſhears worked by a wheel; theſe are extended and made quite ſmooth and of an uniform thickneſs by being paſſed between two iron rolling cylinders: they are then rendered harder by being rubbed with urine, heated red hot, and ſuddenly cooled in water, and if neceſſary, again rolled out and poliſhed. The copper ſheets thus prepared are ready to be applied to a variety of purpoſes. Some are cut out in a circular form, and

carried

carried to the *battering-mills*, where they are ſubjected to the rapid action of hammers moved by water, and as the workman turns the plate round and round under the hammer, it is made to aſſume the form of a baſon of any ſize or depth. Theſe are afterwards annealed in a furnace heated to a full red heat. Copper pans of very large dimenſions are beat out in this manner.

Others of the copper plates are applied to the making of wire. Theſe are cut out by the large clippers into long narrow ſtrips, which are taken to the wire mills, where by a moſt ingenious and ſimple proceſs, aſſiſted by great mechanical force, they are drawn through bored plates of iron to wire of different thickneſs, which is afterwards rounded and finiſhed in ſimilar mills, but of inferior power and nicer workmanſhip. This ſpinning of wire is one of the moſt curious and entertaining parts of the buſineſs.

But the greater part of the copper ſheets are uſed in this form for ſheathing large

large ſhips. They are applied only of a ſingle thickneſs, and joined together by copper bolts; the ſheets are of different degrees of thickneſs, the greateſt for men of war and India-men, the leaſt for cutters, or even long-boats, which have of late been coppered. The arts and manufactures alſo create a large demand for plates and ſheets of copper, and not a few are purchaſed by the Eaſt-India company, who export them to China, where they are uſed to dry the tea upon.

Beſide the caſting of plates, there is in theſe works a ſmall forge for caſting various minuter articles of braſs or copper, both for ordinary purpoſes, and alſo for bracelets, and certain pieces in the form of a horſe-ſhoe, which are exported in vaſt quantities to Africa, where the former are uſed by the natives for ornament, and the latter for current coin called *Manillas*.

The laſt manufacture to be mentioned of the raw copper, is that of long thick bolts, uſed in building large ſhips. Theſe are caſt in this form, and afterwards

ſmoothed by being hammered in a groove of caſt iron; over which they are paſſed backwards and forwards till of equal dimenſions throughout: their length appeared to be from eight to ten feet.

The manufacture of *braſs* forms another diſtinct operation in theſe vaſt and various concerns. The calamine employed is received raw from the mines in the neighbourhood, or at leaſt only roaſted to expel the ſulphur. This ore is firſt pounded, and then waſhed and ſifted, in order to ſeparate the lead which is always mixed with it, often in large proportion. The calamine is then calcined on a broad ſhallow brick hearth over an oven. It is afterwards pounded in a mill for the purpoſe, in which is alſo ground charcoal to be mixed with it. The furnace in which the braſs is made, is a large round receptacle ſunk in brick-work, and having a round hole at the top through which the crucibles may be examined. The furnace contains ſix crucibles, juſt raiſed above the fewel, which is coal, but the flame of which draws

draws round them to the opening at the top. The crucibles are charged with calamine and charcoal mixed, alternating with a layer of copper-ſhot (made by dropping melted copper in cold water), or the clippings of the copper plates, and put into the furnaces, of which there are four. A bright red heat is kept up for nearly 24 hours, at the end of which time the copper is thoroughly impregnated with the zinc revived from the calamine, and is found at the bottom of the crucible. The quantity of braſs thus procured from the ſix crucibles, is ſuch as would fill one of them, and makes a ſingle braſs plate which is manufactured as the copper.

The articles of chief importance exported from theſe works, are

I. Copper ſheets and nails, for ſheathing ſhips.

II. Copper bolts, for building ſhips.

III. Copper and braſs wire, of various dimenſions.

IV. Copper plates for various purpoſes,

many of them moſt beautifully poliſhed in a lathe.

V. Manillas, bracelets, and a vaſt variety of other ſmaller articles for uſe or ornament, exported to Africa.

VI. Copper and braſs pans, ſome of them of vaſt ſize, and uſed at home; others, made very broad and ſhallow, are ſent to Africa, where they are employed in making ſalt from the ſea water by evaporation in the ſun.

The whole of the manufactured copper and braſs is ſhipped on the Dee juſt below the manufactory, and ſent to the great warehouſes which the company poſſeſſes at Liverpool, whence much is ſent to London, America, India, and other ports. The coals uſed here are procured from pits at a ſmall diſtance in Flintſhire. All the mechanical power (which is enormous) is given by the ſtream from the holy well to large water-wheels of caſt iron, made by Mr. Wilkinſon at Coalbrook-dale.

Four

Four cotton mills are alſo indebted to this well for the principle which ſets every wheel in motion; and the cotton ſpun here is much eſteemed on account of the uniform texture and quality produced by the conſtant, regular, and little-varying force which this body of water exerts. The well diſcharges about 21 tuns of water in a minute from the ſpring head, and has never been known to freeze in the ſevereſt winters.

We left Holywell this evening, a town which has afforded us no ſmall degree of gratification from the variety of intereſting circumſtances, natural and artificial, that are centered within it. We took the road to Denbigh, and during the greater part of our walk were indebted to a clear ſky for many a beautiful moonlight ſcene that ſtruck our eye in this rich, well-adorned country.—Slept at Denbigh.

CHAP. XVII.

From Denbigh to Shrewſbury, 62 miles.

August 20.

DENBIGH is a place of conſiderable importance, containing many very good houſes; and, being the county town, is furniſhed with a public hall and the other neceſſary buildings. It is ſituated nearly in the centre of the rich vale of Clwyd. On leaving Denbigh we traced this vale to its ſource. It ſtill retains the character of luxuriant fertility, and ſupports a great population; as it contracts, however, it becomes a far more pictureſque object, eſpecially beyond Ruthin, where it is bounded by Moel Vamma and other lofty limeſtone hills on the Flintſhire ſide, and towards the ſouth by the ſlate rocks of a corner of Merioneth, the declivities of which

which are covered with extenſive woods, waving over the deep golden harveſt that occupies the lower part of the valley. We aſcended by the Merionethſhire ſide, and after croſſing rather a barren mountainous tract, came in ſight of the valley of the Dee in our road to Corwen. Here we again recognized in the diſtant ground the lofty ſummit of Arran-ben-Llyn, and the other high mountains that overlook the lake of Bala. In the afternoon we croſſed the Dee, almoſt hid in its broad rocky channel, and reached the town of Corwen, ſituated on its banks.

Aug. 21. The road from Corwen to Llangollen is for the moſt part a terrace ſeveral yards above the Dee, whoſe courſe it accompanies, preſenting at every turn ſcenes of ſuch richneſs and romantic beauty as are ſcarcely ever beheld in union; the high golden tint of the corn, the bright green of the paſtures and woods, contraſted with the bare purpliſh ſlate rocks that ſhut in this narrow ſlip of fertile land, and the whole enlivened by the windings of the

Dee, ſometimes flowing placidly along, but oftener hurrying down a long ſucceſſion of rapids formed by the remarkable irregularity of its rocky channel, produce a number of exquiſitely beautiful combinations, each well worthy of a faithful repreſentation by the pencil of our beſt artiſts.

Oppoſite to Llandyſilio we forded the river, and turned up the ſmall vale of the croſs, in order to viſit the ruins of Llan Egweſt Abbey, the remains of a handſome gothic building. Part of the monaſtery is fitted up as a farm-houſe, but the chapel continues in ruins, and many fine aſh trees have taken root and eſtabliſhed themſelves in its area, rearing their heads high above the mouldering walls. Hence a ſhort walk brought us to Llangollen, a ſmall town that gives its name to the vale in which it is ſituated. The vale of Llangollen has been the ſubject of much admiration both in verſe and proſe, and in many reſpects merits the praiſes that have been beſtowed upon it: but in richneſs it

is

is not comparable to the vale of Clwyd, nor for picturesque scenery is it equal to the vale of Festiniog. The Eglwyseg rocks, a formal range of limestone crags on the north-west side, greatly disfigure some of its most beautiful scenes; yet the prospect from its mouth, where it sinks into the plain of Salop, up towards its commencement, is uncommonly striking and beautiful.

A few miles from Llangollen we came to *Offa's dyke*, a long low mound of earth which runs nearly in a straight line through a great extent of country, being formerly the boundary between England and Wales. Soon after we arrived at the neat village of Chirk; leaving on our right Chirk-castle, an ancient seat of the Middleton family, surrounded by a fine park and extensive woods, which stretch as far as the beginning of the Ferwyn mountains. The small vale of the river Ceiriog, one of the tributaries of the Dee, upon the side of which stands Chirk, is the present boundary between England and Wales; we crossed

croſſed the ſtream by a handſome ſingle-arched bridge, and ſoon after arrived at Oſweſtry.

The mountains from the vale of Clwyd through Corwen to Llangollen are ſlate and ſhale. The Eglwyſeg mountains, on the north and north-weſt of the vale, are of lime, which croſſes the valley at its mouth, and forms a range of hills at the foot of the Ferwyn mountains, on one of which Chirk is ſituated. The ſides of the vale of Ceiriog are calcareous freeſtone; and a little further on towards Oſweſtry the road is cut through an alluvial hill compoſed of rounded fragments of limeſtone, ſlate, ſchiſtus, and whin, which ſinks gradually into the plain of Salop.

Aug. 22. We quitted Oſweſtry early this morning, and after a walk of ten miles completed our circuit at *Neſcliff*, which we paſſed four weeks ago on our way to the Welſh border. A further walk of eight miles brought us again to Shrewſbury.

CHAP.

CHAP. XVIII.

On the plain of Salop.

PREVIOUSLY to ſome general remarks on the mineralogy of North Wales, it will be of advantage to deſcribe the ſtructure of that low tract of land compoſing the vaſt valley between the hills of Wales, and thoſe of Derbyſhire and Staffordſhire; and which includes the northern part of Shropſhire, and the whole of Cheſhire. The Shropſhire portion being the moſt intereſting, I ſhall give a *particular* account of this, and content myſelf with a more general view of the nature of the Cheſhire ſoil.

The plain of Shrewſbury is a tract of conſiderable extent, divided by the Severn into two unequal portions, and, though flat when compared with the ſurrounding

hills, of a very varied ſurface. Its greateſt extent from north to ſouth may be reckoned about thirty miles, comprehending the ſpace between Whitchurch and Church-Stretton: its breadth from Oſweſtry to Coalbrook dale is about 28 miles. A range of limeſtone from Ruabon to Llanymynech, and the Breddin-hills, form the weſtern boundary; the northern extremity terminates on the borders of Cheſhire and Flintſhire; the eaſtern line conſiſts of the hills on the Staffordſhire border, the Wreakin, the hills of Acton-burnel, Frodſley, the Lawley, and Caer-Caradoc: the ſouthern boundary is formed by the Longmont, Stiperſtones, and Longmountain.

From Hawkeſton ſouthwards to Lea and Grinſhill hills, extends a line of calcareous freeſtone, chiefly of the red kind, except at Grinſhill, where there is a conſiderable quantity of white, reſembling the Portland ſtone, of which great uſe has been made in the bridges, churches, and other modern edifices of Shrewſbury. To the

the weſt of this is another ridge of the ſame kind of ſtone, beginning a little north of Elleſmere, and in its progreſs ſouthwards dividing into two branches, one of which deſcending between Elleſmere and Whixall moſs, touches upon Wem, includes Middle and Armor hills, and terminates in Pym-hill: the other branch paſſing to the weſt of Elleſmere, reaches the river Perry, which it accompanies to its junction with the Severn under the names of Neſcliff and Leaton ſhelf, then croſſing the Severn, it terminates in the high grounds at Bickton and Onſlow. I have not heard of any ſhells or other marine exuviæ being found in theſe rocks. The vallies between each ridge contain marl, more or leſs mixed with ſand or clay. At Hawkeſton and Pym-hill, the ſummits of ſome of the rocks are tinged with green carbonate of copper. This tract, about 17 miles from north to ſouth, and varying in breadth from eight to fourteen, has but few running waters, but abounds in large pools or

or meres, of which the chief are the pools of Ancott, Marton, Fennymoor, and five others of conſiderable ſize near Elleſmere.

Weſtward hence, is a narrow ſlip of looſe ſand, which borders upon another of marley clay mixed with alluvial fragments, in which near Chirk, Ruabon, and Oſweſtry, are found conſiderable quantities of coals. This clay is bounded by a low ridge of tender ſhale, repoſing on the baſe of the limeſtone rocks which overhang it: but between Chirk and Oſweſtry (where the lime is entirely wanting, or moſt probably lies at a great depth below the ſurface), riſing immediately upon the ſlate mountain of Selattyn, one of the Ferwyn chain. The exterior boundary to the weſt, conſiſts of the limeſtone, which deſcending from the vale of Clwyd, riſes into the Eglwyſeg mountains and Chirk lime-rocks, is interrupted near Oſweſtry, and appears again in the hill of Llanymynech, in which is found carbonate of copper interpoſed between the ſtrata of lime.

The

The rock compoſing the whole of this range is very hard, and contains but few ſhells.

On the north-eaſt of the plain, the calcareous freeſtone extending from Hawkeſton towards Salop, is bordered by a range of argillaceous ſchiſtus; commencing in Hagmond hill, about two miles from Shrewſbury. This hill is compoſed of primitive argillaceous ſchiſtus interſperſed with mica, and baſed upon porphyry; the ſtrata are nearly perpendicular to the horizon, and its eſcarpement faces the Severn, that flows within half a mile of its bottom. The valley eaſtward, between this ridge and the Wreakin, conſiſts of alluvial ſoil and tender ſhale. The Wreakin itſelf, with two other ſmaller hills on the north and ſouth of it, conſiſts of a coarſe dark grey whin, red on the ſurface, owing to the oxidation of its iron. It is craggy at the top, and ſo much higher than the ſurrounding hills, as apparently to riſe alone from the middle of the plain; its plan is a long oval, pointing nearly north

and

and ſouth; its figure very exactly reſembling that of a *whale* aſleep on the ſurface of the ſea; the ſtrata, which are perpendicular to the horizon, lie eaſt and weſt, or acroſs the ſhort diameter. The moſt precipitous ſide of the mountain is the eaſtern; its height is reckoned about 1200 feet. Eaſtward of the Wreakin is found clay and ſhale containing coal. Next to this, from Newport to Coalbrook-dale, between Wellington and Shifnal, extends a vaſt body of ironſtone and coal, which is bounded on the eaſt by a long broad line of ſand and calcareous freeſtone, beginning north of Shifnal, then croſſing the Severn, and accompanying its courſe on both ſides of the river from Bridgenorth to Wolverhampton, which is the furtheſt diſtance that I have traced it; but in all probability it accompanies the Severn as far as the lime-rocks near Briſtol. Parallel to the Severn, and at a little diſtance from it, between the Wreakin and Coalbrook-dale, runs a narrow ridge of aggregate rock, conſiſting of quartz, ochre, and other

rounded pebbles in a calcareous cement; the pebbles vary in ſize from coarſe ſand to the bulk of a pigeon's egg. Large cubical blocks of this ſtone are uſed for the foundation of the new iron bridge lately erected at Bildwas abbey. The rocks on both ſides of the river, at the entrance of Coalbrook-dale from Shrewſbury, are compoſed of lime; and form the northern extremity of a long range which paſſes by Wenlock in a ſouth-weſt direction as far as Ludlow. It is this ſingular combination of coal, iron ore, and lime, together with the advantage of water carriage, that renders Coalbrook-dale the centre of the moſt extenſive iron works in the kingdom: the ore for the moſt part is ſo poor as in leſs favourable ſituations to be hardly worth the trouble of reducing, yet here, where the fewel and flux are near at hand, it is made the ſource of aſtoniſhing wealth, and ſupports a population of many thouſands.

Cloſe to the inclined plane from the

Ketley canal to the Severn, is a ſpring of petroleum, or foſſil-tar; it was cut into upon driving a level into the hill (which is of red ſandſtone), in ſearch of coal; the quantity that firſt iſſued was to the amount of three or four barrels per day, but at preſent there ſeldom flows out more than half a barrel in the ſame period. The limeſtone is for the moſt part of a light bluiſh grey, very hard, and incloſing but few remains of organized bodies: on the ſides of the large excavation at *Lincoln hill* petroleum is ſeen ouzing out, but it appears to be merely percolating through the rock, not chemically uniting with it; for the lime thus impregnated, has nothing of that ſtrong diſagreeable ſcent which characteriſes the common ſwine-ſtone, which is a combination of the ſame ſubſtances, that in this inſtance are only very looſely mixed. The cliffs of *Bental-edge* on the oppoſite ſide of the river, contain many fine ſpecimens of cryſtallized lime, particularly a fleſh-coloured tabular ſpar, ſprinkled

ſprinkled with iron pyrites, and in appearance greatly reſembling the ſulphate of baryt.

Meteorology is a ſubject that of late years has excited the attention of ſeveral natural philoſophers, and accurate regiſters are kept of the variation of temperature, the weight of the atmoſphere, and the quantity of rain; on the laſt of theſe ſubjects, the calculations muſt neceſſarily be very inaccurate and imperfect, ſo long as pluviameters even the moſt correct are the only inſtruments made uſe of. The heavieſt ſhowers are generally thoſe which are the moſt circumſcribed, and it may often happen that one or two inches of rain may fall at one place, while another not a mile off does not receive a ſingle drop; on this account it ſeems abſolutely neceſſary, in order to draw general concluſions, to contrive ſome method of eſtimating the quantity of rain that falls upon very extenſive ſurfaces: perhaps it is not eaſy to attain great accuracy in theſe more comprehenſive obſervations, yet even im-

perfect results may be of great use when corrected by more exact, though more circumscribed ones. Part of every shower that falls, is imbibed by the earth; and this will be proportioned to the antecedent dryness or moisture, depth or shallowness of the soil: a considerable portion however flows off into the brooks, and thence through the rivers into the sea. Now the whole of this portion may in most places be determined with considerable accuracy, and I know no station so well adapted to observations of this kind as Coalbrook dale. At the iron bridge, the river is confined on both sides by upright piers of masonry that serve as the foundation to the iron arch; the breadth of these piers on the water side is about 25 feet. If therefore a graduated scale was attached to the piers, to measure the rise or fall of the stream, and a log-line thrown twice or thrice a day under the arch to note the rate of the current, the quantity of water might thus be ascertained: in time a general ratio of the rate to the depth would be

be procured, and then the obſervation of the graduated ſcale alone would be ſufficient. By theſe means, the quantity of ſuperfluous water from about 1260 ſquare miles would be known, including, beſides the plain of Salop, a great part of the counties of Montgomery and Merioneth.

Having deſcribed that part of the plain of Salop north of the Severn, I ſhall proceed to notice, in the order of their poſition from eaſt to weſt, thoſe ridges which lie on the ſouth ſide of the river. Of theſe the firſt is the *limeſtone* ridge, which commencing in Lincoln hill at Coalbrook dale, proceeds in a ſouth-weſterly direction towards Stretton; near which place being forced to the ſouth by the hills round Hope-Bowdler, it deſcends nearly in a right line to Ludlow. The form of theſe hills is the ſame with that of every other limeſtone range, at a ſufficient diſtance from the primitive mountains. (For, as Sauſſure well obſerves, the neighbourhood of mountains of granite, porphyry, whin, &c. being themſelves of an irregular conical ſhape, tends to diſorder

the poſition of ſuch ſecondary and flôtz ſtrata as approach very near them, probably by ſerving as their baſe.) The outline of a limeſtone hill commonly riſes from the plane of the horizon with an angle of about 25 degrees, till it reaches the height of three or four hundred feet; it then proceeds in a direction nearly level with its baſe, but more uſually aſcending than deſcending, for the ſpace of half a mile or even a mile; and at length drops down into the plain at a very large angle, approaching frequently to a right angle; and this precipitous deſcent is called its *eſcarpement*. Of the range of hills now under conſideration, the eſcarpement is to the ſouth-weſt, and the ſteepeſt deſcent of the ſide is that towards the plain of Salop. Near Coalbrook-dale the lime abounds in cryſtals, is very hard, and incloſes few ſhells: about Wenlock the ſhells increaſe in number; there are few diſtinct cryſtals, but great part of the rock is a coarſe confuſedly cryſtallized marble. As the hills proceed further ſouth, they alter ſomewhat in ſhape, the difference between the

the aſcent and eſcarpement being leſs perceptible, like the ſhale hills: the lime is mixed more with clay, the ſtrata become thinner and more like ſchiſtus; the only appearances of cryſtallization are between the ſtrata, which encloſe a great number of ammonites and other foſſile ſhells: and the ſubſtance of the rock becomes ſo ſoft as to be eaſily broken down by a ſmall hammer.

Weſtward of this ridge, is a valley whoſe ſoil conſiſts of clay and lime: its breadth is about two miles, and its length from Coalbrook dale to Stretton valley is nearly fifteen miles. No coal is at preſent procured from any part of this tract, but it is evident from its poſition, its ſoil, and the remains of ſome old pits, that it contains beds of this very valuable commodity.

This valley, to the weſt, is bounded by ſome low hills of micaceous argillaceous ſchiſtus; ranging for the moſt part, without any intermediate valley, along the baſe of a ridge of primitive mountains. This

ridge, of which the Wreakin is the northern extremity, appears on the ſouth ſide of the Severn, in the ſame line with the Wreakin, and conſiſts of the hills of Acton-Burnel, Frodſley, the Lawley, Caer-Caradoc, and Hope-Bowdler hills. Each of theſe, like the Wreakin, has the long diameter from north to ſouth, and the direction of the perpendicular ſtrata is the ſame with the ſhort diameter; they are craggy at the top, and aſcend from the plain of Salop very abruptly at an angle of about 60°. They abound in whin, porphyry, green earth, fragments of whin &c. in a clay cement, and are baſed upon granite. Of this ridge, thoſe hills which form the eaſtern ſide of Stretton-valley, have their baſes covered by a bed of very ſhivery ſhale riſing to the height of 2 or 300 feet. The vale in which Church-Stretton is ſituated, ſeparates the whin mountains juſt deſcribed, from a very ſingular maſs of hills called the *Longmont*. They aſcend gradually from the plain to the height of about 400 feet, and then with a very

very level and unvaried ſummit, ſtretch for ſeveral miles towards Biſhop's-caſtle. Squareneſs ſeems the peculiar character of theſe hills, both in their plan and outline; and from Stretton vale this ſingularity appears to the greateſt advantage. Three or four lines of hills are ſeen riſing above one another, the form of each of which was in all probability nearly a cube; at preſent however, from the diminution of their tops and the proportionate enlargement of their baſes, they approach nearer to the figure of a truncated pyramid. Almoſt every individual is ſeparated from the ſurrounding hills by a deep narrow valley or glen with a ſtream flowing through it, forming occaſionally ſmall caſcades, and here and there overhung by woods. The ſubſtance of which the Longmont is compoſed, as far as my own obſervations have extended, is ſolely a very ſhivery kind of ſchiſtus; it is covered for the moſt part with heath and ſhort graſs, and furniſhes an extenſive paſture for many ſheep. Several brooks take

take their riſe here, ſome of which flow northward into the plain of Shrewſbury, and others tend ſouthwards, watering the country between Biſhop's-caſtle and Ludlow.

Following the mountainous line that forms the ſouthern boundary of the plain of Salop, we next come to a very elevated rocky tract between the high road from Shrewſbury to Biſhop's-caſtle, and the vale of Montgomery. The moſt elevated peak of this aſſemblage of lofty hills, is called the *Stiper-ſtones:* its ſummit is extremely craggy, and overſpread with enormous looſe blocks of whin, that at a diſtance appear like the ruins of ſome great fortreſs. In height it is rather ſuperior to the Wreakin, and forms the abrupt termination of a line of primitive mountains that hence extend ſouth-weſt into Radnorſhire. Towards the plain of Salop the baſe of the whin is bordered with banks of argillaceous ſchiſtus, and a black ſtone containing argil, lime, and iron; of this compoſition the lime forms ſo great a part,

a part, that upon the addition of water, after calcination, the ſtone breaks down into a coarſe powder; this in a country ſo far from lime ought to be a valuable article, and yet the only uſe that I have ſeen it put to, is mending the road between Minſterly and Wilmington.

Lead is procured in conſiderable quantity from various parts of the Stiperſtones. The Bog-mine, which is the higheſt up the hill, is at preſent, I believe, choaked with water; the other two, viz. the Hope and Snailbeach mines, are opened in the bank of ſchiſtus that repoſes on the whin: the latter mine, which is the only one that I have deſcended, is worked to the depth of 180 yards. The matrix of the ore is cryſtallized quartz and carbonate of lime, both the rhomboidal and dog-tooth ſpar; the rhomboidal is frequently covered with pyramidal quartz cryſtals, and the quartz itſelf is overſpread in many ſpecimens with iron pyrites and very minute needles of dog-tooth ſpar. The ore is,

I. *Sulphuret*

I. *Sulphuret of lead*, both galena and ſteel ore, which latter contains ſilver.

II. *Carbonate of lead*, cryſtallized.

III. Red lead ore.

IV. Blende, or black jack.

The *red lead ore* was firſt diſcovered in theſe mines by Raſpe, a German mineralogiſt. I have ſeen a ſmall ſpecimen, but not being allowed to analyſe it, am unable to ſay in what reſpects it agrees with, or differs from the Siberian red lead ore that was found in the year 1776 near Catharineburgh by Mr. Lehmann, except as to its external appearance. The ſpecimens from Siberia exhibit rhomboidal, obliquely truncated, tetrahedral priſms, and contain according to Macquart's analyſis, per. cent. lead 36, oxygen 37, iron 25, alumine 2. The Snailbeach red lead greatly reſembles the pulverulent cinnabar ores, being entirely free from cryſtals. Its matrix is a dark ſtone evidently containing iron; whether however it derives its colour from the iron, or is a native *minium*, I know not. The lead ore is reduced at Minſterly

Minſterly and other places near the mines, whence it is ſent by land carriage to Shrewſbury; here it is ſhipped, together with the raw calamine, in the Severn barges, and ſent down to Briſtol.

The country between the vale of Montgomery and the vale of Severn, is entirely occupied by two maſſes of hills, one the *Long-mountain* with its dependencies, the other the *Breddin hills*; a brief deſcription of theſe will complete the account of the ſouthern boundary of the plain of Salop. The Long-mountain is about the ſame height as the Longmont, and thoſe parts of it that border the vale of Montgomery reſemble conſiderably, in ſquareneſs of form, the hills on the weſtern ſide of the vale of Stretton. The principal part of the mountain is compoſed of a ſhale more or leſs tender, covered on the very top with an alluvial ſtratum of rounded pebbles of various ſorts, in a grey clay; the eſcarpement towards the vales of Severn and Montgomery is very ſteep, and it ſinks gradually into the plain. Almoſt oppoſite

oppoſite Pool is a circular entrenchment called Beacon ring, the eaſtern ſide of which, and of moſt other banks on the mountain, is covered with *ſheep-ſcats*, while on the oppoſite ſide not a ſingle one is to be ſeen; a ſingular and convincing proof of the violence and frequency of weſterly winds. That ſide of the mountain which fronts the Severn, inſtead of being broken like the eaſtern into diſtinct hills, is almoſt one continued ridge. It differs alſo in its compoſition as well as form; the ſhale is much leſs ſhivery, and approaches nearly to the texture of coarſe argillaceous ſchiſtus; as it approaches Breddin it becomes mingled with ſmall rhomboidal cryſtals, or amorphous ſtriated laminæ of calcareous ſpar; ſerpentine with green, ferruginous, and purple ſpots alſo occurs, eſpecially near Breddin: the ſpar often forms ſo large a proportion of the rock, that it might probably be burnt, and uſed with advantage as a ſubſtitute for limeſtone.

A narrow winding valley from the vale of Severn to the plain of Salop, ſeparates the

the Long-mountain from the three hills of Breddin, Moel-y-golfa and Cefn-ceſtyll; a maſs of rock about 1000 feet in height, with three diſtinct ſummits: the northern and weſtern ſides of this mountain are in moſt places nearly perpendicular, and in ſome parts the ſummit overhangs its baſe; it is therefore almoſt inacceſſible except on its ſouthern and eaſtern ſides, and even here the aſcent is very laborious. The greater part of the rock conſiſts of perpendicular ſtrata of ſerpentine of a light green colour, with dark green or almoſt black ſpots, here and there mixed with lime in very ſmall grains; it is remarkably tough, will not ſtrike fire with ſteel, and has lately been uſed in architecture, the aqueduct over the Virnwy being built of it. There are a few banks of ſhale and alluvial ſtrata reſting on the weſtern baſe of this mountain. The view from Rodney's pillar on the top of Breddin, is perhaps the moſt ſtriking of any on this part of the Welſh border: the near proſpect is almoſt the ſame as has been already deſcribed

ſcribed from Llanymynech hill, conſiſting of the vales of the Severn, Virnwy, and Tannad; but, owing to the ſuperior height of Breddin, the view, inſtead of being bounded by the Ferwyn mountains, extends over theſe as far as Plinlimmon, Cader Idris, and Arran-ben-Llyn, whoſe pointed ſummits finely diverſify the extenſive line of horizon. Several rare plants alſo are found here; *Cratægus aria, Veronica hybrida, Papaver cambricum, Sedum rupeſtre, Pteris criſpa, &c.*

From the Stiper-ſtones a range of low hills proceeds in a north-eaſterly direction as far as Shrewſbury, known under the names of Lyth-hill, Baiſton-hill, and the Sharp-ſtones: they conſiſt for the moſt part of argillaceous ſchiſtus, mixed with mica; in ſome places, however, the rock is covered with an indurated ſtratum of various thickneſs, conſiſting of rounded pebbles, in ſize from a walnut to a grain of corn, cemented by clay; the pebbles are quartz, ſemi-tranſparent, varying in colour from pure white to fleſh colour, and containing

particles of mica. On the weſt, however, of Lyth-hill, deſcending to Meol brook, are ſeveral beds of a ſtratified rock, conſiſting of clay, ſulphuret of iron, and lime: on the addition of nitrous acid a very lively effervescence takes place; it melts into a porous ſhining black ſlag on being kept a few minutes in a white heat in an open fire; when expoſed to an inferior degree of heat and plunged into water, a conſiderable quantity of hepatic gas is extricated. This rock ſhelves gradually down to Pulley-common, and is there terminated by beds of ſoft lime and coals; this latter mineral indeed is found accompanying almoſt the whole courſe of Meol-brook: there are three ſtrata lying over each other; the firſt, called *funkers*, are intimately mixed with a large proportion of iron pyrites, and are only uſed for burning lime and bricks; the next are of ſuperior quality, but the loweſt are by far the beſt: they are of a deep ſhining black, ſoil the fingers but little, and are ſo inflammable as to take fire when held a few

moments in a candle *. Salt ſprings are found in many of the pits, of which one at Sutton is in great repute as a very efficacious purgative.

The ſoil of the plain of Shrewſbury ſouth of the Severn, is for the moſt part either a clay or gravel; by gravel I mean rounded pebbles of various ſizes, mixed with ſand and clay.

The pebbles may be divided into I. Calcareous. II. Decompoſed granits and other primitive ſtones. III. Undecompoſed granits, &c.

I. *Calcareous pebbles.*

Theſe are 1. A dark grey limeſtone, conſiſting of an aggregation of ſpherules of lime about the ſize of a pea, in a calcareous cement.

2. A dark blackiſh-grey limeſtone, of a conchoidal fracture; containing lime, argil, and mica, reſembling Kirwan's compact limeſtone. var. 2.

* The coal from the *Welbach pits*, is eſteemed the beſt of any on the brook.

3. Purple

3. Purple ſtreaked marble.

4. Rediſh brown marble with petrifactions.

5. Shelly indurated marl.

II. *Decompoſed primitive ſtones.*

1. Quartz and calcareous ſpar (ſecondary granit of Sauſſure).

2. Hornblende ſchiſtus, with irregular ſtrata of calcareous ſpar.

III. *Primitive ſtones.*

1. Simple granite, i. e. compoſed of quartz, felſpar, and mica.

2. Granite, with red felſpar.

3. Granite, with red felſpar, iron pyrites, and carbonate of iron.

4. Sienite. (Of Kirwan.)

5. Sienite, with decompoſed iron pyrites.

6. Porphyry, of various kinds, chiefly the argillaceous. (vid. Kirwan.)

7. Serpentine.

8. Serpentine and felſpar.

9. Toad-ſtone.

10. Quartz.

Various other combinations of ſtones might no doubt be found among the alluvial fragments of the plain of Salop by an attentive inquirer; thoſe, however, above enumerated, occur moſt frequently, forming by far the largeſt portion of the ſtony ſubſtances that are diſtributed through the ſoil.

Having now laid before the reader the chief mineralogical facts relative to North Wales, and the north plain part of Shropſhire, I ſhall in the next chapter conclude the ſubject by a few geological conjectures, towards which I muſt beſpeak that indulgence which a ſubject confeſſedly of ſo great uncertainty, and therefore which has given birth to ſuch bold and various hypotheſes, neceſſarily requires.

CHAP.

CHAP. XIX.

Geological Obſervations.

I. THERE are no proper volcanic productions to be met with in North Wales; by proper volcanic ſubſtances, I mean aſhes, pumice, lava, and ſcoriæ or ſemi-vitrified ſtones, ſuch as are the peculiar products of Etna and other acknowledged volcanoes. A variety of porous ſtones may be found on Cader Idris and Snowdon, and theſe have been miſtaken for cellular lava; they conſiſt, however, merely of decompoſed granite, porphyry, or toad-ſtone; fragments of this laſt, indeed, I have found in the plain of Salop, ſo porous and penetrated with carbonate of iron, as greatly to reſemble a ſlag.

II. The indefatigable Sauſſure, whoſe accurate reſearches into the poſition and

nature of the Alps and the other ſurrounding mountains, have deſervedly ranked him among the moſt illuſtrious and perſevering mineralogiſts, ſays in the firſt volume of his *Voyages dans les Alpes*, "It is a "general obſervation, with few exceptions, "that in the greater chains of mountains "the exterior ridges are of lime, the next "contain ſlates, to theſe ſucceed the pri-"mitive ſtratified roeks, and then the "granits." The relative poſition of the Welſh mountains, tends to confirm a remark made among the Swiſs Alps. For if from the central ridge of the Snowdon chain (in which term I comprehend the whole mountainous extent of Caernarvonſhire from north to ſouth), we proceed to the Menai, it will be found that the primitive rocks in maſs, ſuch as the granits and porphyries, occupy the interior and higher peaks: to the ſide of theſe are applied the banks of primitive ſtratified rocks, then come the ſlates, which terminate in the limeſtone which forms the bank of the Menai. The ſame gradation

of

of ſtrata will appear, if, inſtead of the weſtern, we examine the eaſtern ſide of Snowdon; the variation is not indeed ſo ſudden, but perhaps on that very account is more intereſting, as the ſpecies and varieties of rocks are more numerous, and in larger maſſes. From the peak of Snowdon to Llanrwſt, through Capel-Cerig, are found granite and porphyry in maſs, micaceous ſchiſtus, and other primitive ſtratified rocks; ſerpentine in large blocks and of extraordinary beauty, and hornblende ſlate mixed with veins and rocks of quartz; from the vale of Llanrwſt to Llangollen extend the ſlates, which are there circumſcribed by the limeſtone range already mentioned. The general diſpoſition of the mountains of North Wales may be deſcribed in a very few words. There are two ridges of *primitive mountains* extending nearly due north and ſouth, of which one is the Snowdon chain, and the other the Cader Idris chain (comprehending, beſides this mountain, the Arrans and other lofty peaks that overlook the ſouth-

ern extremity of Bala-pool). Owing to the near approach of the primitive and ſecondary mountains to the coaſt of Merioneth, the *lime* does not commence till near the port of Crickaeth; hence proceeding northwards in an interrupted line along the ſhore, it arrives at Caernarvon; from this place it proceeds along the Menai, forming the eaſtern bank, as far as Bangor ferry: hence to Ormes head, it is cut off by the northern extremity of the Snowdon chain, which terminates in the bay of Conway by the cliffs of Penmaen-mawr and Penmaen-bach. The lime, recommencing in the lofty promontory of Ormes head, continues the boundary of the coaſt as far as the mouth of the Dee; it then takes a weſterly direction curving to the ſouth, as it paſſes by Holywell and the upper end of the vale of Clwyd to the Eglwyſeg rocks in Llangollen vale; then, paſſing due ſouth, it appears on the oppoſite ſide of the vale, is broken near Oſweſtry by the Ferwyn mountains, appears again at Llanymynech,

nech, and is at length ſtopped in its courſe by a line of primitive mountains, ſtretching northwards out of Radnorſhire. The *ſlates* occupy the whole intermediate ſpace between the ridge of lime and the primitive mountains.

The primitive, ſecondary, and derivative mountains, may in general be diſtinguiſhed by peculiarities in their *form* *, as well as by their relative poſition; the primitive rocks are craggy, ſteep, and tending more or leſs to a peak, or ſlender pointed ſummit; the loftieſt mountains are generally about the middle of the chain, which both commences and terminates in abrupt precipices: theſe, together with the inſulated peaks that are continually interrupting the outline of the chain, form a very ſtriking diſtinctive character. The plates to Mr. Pennant's Snowdonia will convey a clearer idea of this than the moſt laboured deſcription; indeed it is but juſtice to obſerve with

* See the plate at the end of the volume.

reſpect

reſpect to thoſe engravings, that they are perfectly accurate repreſentations of the ſcenes which they profeſs to deſcribe.

The ſlates are diſtinguiſhable from the primitive mountains by their inferior height, by the evenneſs and almoſt ſquareneſs of the individual hills, and by the eaſy-flowing, though varied outline of the chains, ſuch as that of the Ferwyn mountains already deſcribed, Ch. III.

The lime and ſand-ſtone hills are conſiderably lower even than the ſlates; riſing in general very gradually at one extremity, and terminating abruptly at the other. The banks of ſand-rock are however broader and rounder than the lime; where the lime is the hardeſt, its form is the moſt perfect; but as it becomes ſlaty, ſoft, and mixed with clay, it approaches nearly to the form of the ſlate hills, as is remarkably the caſe in the ſouthern part of Wenlock edge. The ſand-ſtone too, where it contains but little iron and clay, being almoſt wholly compoſed of ſand and lime, reſembles moſt the limeſtone hills.

This

This may be obſerved by comparing the difference of form between the red ſand-rocks of Neſcliff, and the white freeſtone of Grinſhill.

III. I have already mentioned the beds of rounded pebbles that are to be found on the higheſt parts of the ſlate mountains. Their preſent ſituation could never have been that in which they were formed, for they conſiſt almoſt univerſally of porphry, quartz, ſerpentine, and other ſtony ſubſtances which lie in large maſſes compoſing the primitive mountains: their rounded ſhape too, like that of the pebbles on the ſea-ſhore, ſeems to intimate that they have been carried by the force of *water* to the places which they now occupy. Another circumſtance that appears to point out the quarter whence they originally proceeded, is, that in proportion to their vicinity to the primitive mountains, is their ſize: a circumſtance that might naturally be expected, ſince the further they were carried, the more would they be rounded and comminuted. Still, however, there

is a difficulty attending this hypotheſis; namely, by what means could theſe round-ed pebbles have been forced acroſs the many deep vallies that interſect the mountains in all directions, without firſt filling up the vallies themſelves? And if this was the caſe, by what means were the vallies ſo entirely cleared of them afterwards, as they appear now for the moſt part to be? The difficulty however I think is more apparent than real, for it ſeems highly probable that at the time when theſe ſlate mountains were formed under the water, there were no vallies, but the whole maſs was one uniform bank, the vallies being afterwards formed by the rivers, as the water ſubſided; by this not improbable ſuppoſition, as it appears to me, the objection is wholly removed. On deſcending from the ſlate rocks to the limeſtone, and the derivative hills, the marks of ſubmerſion are more numerous and unequivocal, ſand, pebbles, ſhells, and other marine exuviæ, being found in conſiderable abundance. Following the example of

of moſt mineralogiſts, I might indeed have mentioned the *exiſtence* of *lime* as of itſelf a ſufficient proof of ſubmerſion; it appears to me however, that there is by no means evidence ſufficient to ſupport the large aſſertion, that all the lime, which forms ſo conſiderable a part of the ſurface of the earth, has been actually *produced* by the proceſs of animalization: the only *fact* that I recollect, which has any reference to this queſtion, would lead one to draw a directly contrary inference; it being well known that the eggs of hens are without ſhells, when care has been taken in the feeding of the bird to hinder its having acceſs to mortar or any other ſubſtance that contains a large quantity of calcareous matter. Theſe tokens of the preſence of water on the tops of mountains that are now 2000 feet above the level of the ſea, naturally lead one to inquire into the cauſe of this phenomenon, in explanation of which two hypotheſes have been ſtarted; one, that the continents were forcibly elevated

vated to their preſent height above the ſea by ſucceſſive exploſions, as ſome of the Lipari iſlands are known to have been formed; the other, that the ſea has gradually, or ſuddenly, ſubſided to its preſent level, but that no alteration has taken place in the poſition of the mountains. The extreme ſcarcity of acknowledged volcanic productions, ſeems to render the firſt ſuppoſition highly improbable, and it may alſo be objected to it, that an immenſe power, to which we ſee at preſent ſcarcely any thing analogous, is called into exiſtence to accompliſh that which the operation of common allowed cauſes would effect juſt as well. The grand difficulty is to account for the diſappearing of ſo great a quantity of water, nor indeed have I ever ſeen this explained in a tolerably ſatisfactory manner: it is eaſy to imagine vaſt chaſms in the earth into which the waters have retired, but of this there is no proof whatever; it is alſo contrary to the *gradual* decreaſe of the ſea, which,

which, from the preſent appearance of the earth, and from hiſtorical records, appears probable.

IV. The Welſh primitive mountains *in maſs*, contain no metals; copper, however, is found in ſeveral of the hornſtone *ſtratified* mountains, of which the Parys mine, and thoſe at Llanberris and Pont-aberglâſlyn are examples. In theſe mines the ore is for the moſt part yellow ſulphuret of copper: the green and blue malachites or carbonates of copper, are found in limeſtone, as at Ormes-head and Llanymynech hill; nor have I heard any inſtance of theſe two laſt mines furniſhing copper in any ſtate but that of carbonate. Carbonated copper is alſo found in the calcareous cement of ſand-rocks, as has been already mentioned to be the caſe at Pym-hill and Hawkſtone, in the plain of Shrewſbury. Lead and calamine, I believe, are not to be found in North Wales, in any of the primitive ſtratified rocks. Theſe metals are moſt frequently found in

ſlate,

ſlate, with a matrix however of calcareous ſpar, as in the vale of Conway, at Llangynnog, and the Snailbeach mines; they are frequently alſo found in limeſtone, as at Llanymynech and Holywell. Reſpecting the formation of the above-mentioned metals, it is not eaſy to give a tolerably probable opinion; it appears however that carbonate of copper is of conſiderably later formation than the ſulphuret, the former probably originating from the decompoſition of the latter, and deriving its acid from the carbonate of lime in which it is found. It is not likely that the lead found in limeſtone was originally formed elſewhere, becauſe lead, even in ſlate-rocks, lies in a matrix of calcareous ſpar, and eſpecially, becauſe it does not form thin ſtrata between the ſtrata of lime, as is the caſe with copper, but it traverſes in a ſtream the ſeveral ſtrata without any alteration in the line of its direction; to which may be added, that ſulphuret of lead is the general ſtate in which the metal is found,

found, both in the ſlate-rocks and lime-ſtone, the carbonate being equally rare in both ſituations.

There is no coal found in North Wales between the primitive mountains and the ſlates; a very ſmall quantity is procured between the ſlates and limeſtone; but by far the moſt extenſive beds are between the limeſtone and the ſand-rocks, as about Wrexham, or at Coalbrook-dale; or between theſe laſt and the alluvial hills, as round Wolverhampton.

V. From the above-mentioned circumſtances, it would appear that at ſome former period the ſea covered the whole of North Wales, of the preſent plain of Salop, and of Cheſhire, except a line of iſlands conſiſting of the Snowdon chain; another to the ſouth, conſiſting of the preſent Cader Idris chain; and a few detached rocks ſeveral leagues to the eaſt, which now form the tops of the Wreakin, Caer Caradoc, and Stiperſtones. Under this primitive ſea, and prior to the exiſtence of animals or vegetables, the vaſt banks

of ſlate appear to have been formed: my reaſons for thinking that animals and vegetables had as yet no exiſtence, are becauſe there was not ſoil upon theſe hard inſulated rocks for the growth of plants upon which the animals might feed, and becauſe we meet with no impreſſions or remains of organized bodies, in the primitive mountains, or banks of ſlate. By ſlow degrees the water ſubſided; being poſſibly in part abſorbed by the earth, in part fixed in a ſolid form in the ſlates, and in part decompoſed, forming oxygen and hydrogen: the former of which conſtituted the oxygenous baſe of the lower atmoſphere; the latter by its ſuperior levity riſing above the atmoſpherical air, according to the opinion of ſome philoſophers, forms a vaſt ſtratum many miles above the ſurface of the earth, whence originate meteors, the aurora borealis, and other ſimilar appearances.

The water having for the moſt part retired from the beds of ſlate, the greater part of Wales, and the ſecondary hills of the

the Engliſh counties weſt of the Severn, would form one or more conſiderable iſlands, ſeparated from the ſmall part of England then above water, by a wide channel occupying the flat part of Cheſhire and Shropſhire, and the preſent vale of the Severn from Coalbrook-dale to the Briſtol channel. At this period, I imagine the ſecondary limeſtone hills to have been formed. The deſiccation of the water ſtill continuing, the tops of the limeſtone ridges themſelves would begin to appear above the ſurface, and then the plain of Salop, the flat part of Cheſhire, and the ſouthern extremity of Lancaſhire, would form one vaſt bay; into which the Severn, Dee, and Merſey, emptied themſelves, flowing into the ſea by an united ſtream, filling the preſent mouths of the two latter rivers, and the intermediate ſpace, the hundred of Wirral. Into this bay or eſtuary, a large quantity of ſand would be conſtantly poured in by the violent weſtern winds, and the currents of the three rivers not being able entirely to clear

it away, banks of ſand would be by degrees formed, conſtituting the preſent ſand and freeſtone rocks, extending from Neſcliff eaſtward by Pym-hill and Grinſhill to the hills of argillaceous ſchiſtus round the Wreakin; this accumulation of ſand would prevent the free egreſs of the waters of the Severn into the main bay, which by degrees, or more probably at once, urged by a ſtrong weſt wind, and ſwelled unuſually by rains or ſnow, broke through the limeſtone rock at Coalbrook-dale, and ruſhed into the channel which it has ever ſince flowed in. The banks of ſand that almoſt entirely ſhut out the Severn from the bay of Cheſhire, prevented the Dee from deviating from its original courſe, and the further decreaſe of the water added conſtantly to the difficulty. A number of particulars might be mentioned in confirmation of the foregoing hypotheſis, derived from the appearance of the hills, the ſoil and other circumſtances, were it my intention to enter minutely into the ſubject; but this could not be

done without the aid of charts and engravings, in a manner capable of intereſting the attention of any except thoſe who have viſited and careſully obſerved the tract in queſtion.

The ſea however has not been uniformly receding; for ſome time paſt it appears to have been advancing upon the Welſh coaſt: a brief enumeration of the proofs of this will conclude the ſubject.

The coaſt of Cardigan from Aberyſtwith northward, if it does not furniſh any direct proof of the advance of the ſea, yet ſhows at leaſt that the water is not retreating, from the circumſtance of there being no beach at high tide, and the many caverns and receſſes in the ſlate rocks on the coaſt, that are every day filled by the ſea. The ſouthern part of Merionethſhire exhibits certain proofs of the progreſſive ſtate of the ſea, in the vaſt banks of peat already mentioned, which extend along the ſhore to Towyn, and ſtretch to an unknown diſtance into the water. From near Harlech a long range

of ſand and gravel, including Traeth-Mawr and Traeth-Bychan, runs twenty-two miles into the ſea, being called at preſent *Sarn-badrig*, or the *Ship-breaking-cauſeway*; the whole of which tract, formerly called *Cantrér-Gwaelod*, or the *low-land hundred*, was about the year 500, overwhelmed by an inundation, occaſioned by the careleſſneſs of thoſe who kept the flood-gates, as is mentioned in an extant poem of Talieſſin. Northward of the town of Abergeley in Denbighſhire, a vaſt extent of inhabited country is ſaid to have been deſtroyed by the ſea; in proof of which an epitaph without date or name in Abergeley church-yard is cited, ſignifying that the perſon to whoſe memory the monument was erected, lived three miles to the north. A more deciſive evidence is furniſhed by Mr. Pennant in his Snowdonia. "I have obſerved," ſays he, "at "low water, far from the clayey banks, "a long tract of hard loam, filled with "the bodies of oak trees, tolerably entire, "but ſo ſoft as to be cut with a knife as

"eaſily as wax." Finally, I have obſerved on the Lancaſhire coaſt, a few miles north of Liverpool, the beach overſpread with trunks and branches of oak trees; the whole ſhore to a conſiderable diſtance inland, being a peat-moſs, now for the moſt part covered with ſand; the extent of the moſs along the ſhore is very evident by the almoſt blood colour of the beach, occaſioned by the boggy iron ore with which the water that ouzes out of the peat is highly impregnated. From theſe facts it may I think be fairly inferred, that moſt of the preſent ſands which border the coaſt of North Wales and Lancaſhire, were formerly foreſts or cultivated land, and that the ſea is at preſent, and for theſe twelve or thirteen centuries paſt has been, gaining upon the ſhore.

THE END.

Explanation of the Plate.

THE upper ſketch repreſents part of the chain of *primitive mountains* commmencing in the Wreakin, and terminating in Caer-Caradoc. 1. Caer-Caradoc. 2. Acton-burnel. 3. Wreakin.

The middle compartment ſhews a *ſlate mountain* riſing beyond part of the limeſtone ridge that runs ſouthwards from Coalbrook-dale.

In the lower part of the plate is an outline of two *limeſtone ridges*, ſurmounted by a chain of ſlate hills.

Vide p. 217.

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